

Environmental spy



BSA
Copyright 12/10

ACE
SCIENCE
FICTION



ACE 14277-X \$2.25

APRIL-JUNE '79

VOL. 1, NO. 3

Destinies

Edited by JAMES BAEN

**THE PAPERBACK MAGAZINE
OF SCIENCE FICTION AND SPECULATIVE FACT**

Cover Story:

SPIRALS

**BY LARRY NIVEN
& JERRY POURNELLE**

**NEW FACT
AND FICTION BY
POUL ANDERSON
ORSON SCOTT CARD
JOE HALDEMAN
DEAN ING
G. HARRY STINE
SPIDER ROBINSON**



THE PAPERBACK MAGAZINE
OF SCIENCE FICTION AND SPECULATIVE FACT
VOL. 1, NO. 3

0 14
4277 X
225

WELCOME, to this the third issue of **DESTINIES**. As promised in #2, this issue the cover story is a hot-off-the-press novella by Best-sellers Larry Niven and Jerry Pournelle. It's about Space Habitats, Space Industrialization . . . and treachery. Also as promised, Jerry Pournelle gives some straight-from-the-shoulder advice on "How to Become a Space Colonist," and G. Harry Stine examines the problems of "Defending the Third Industrial Revolution." Other stellar contributors include Joe Haldeman, Dean Ing, and Poul Anderson. And the Editor explains the meaning of existence.

Next issue will feature a story/article combination on the next step in space technology: Dr. Charles Sheffield, President of The American Astronautical Society, demonstrates that rockets are only the beginning. (You aren't going to believe what comes next!) Wait till you see the cover. Also there will be stories and articles by Fred Saberhagen (a new Berserker novella!), Jerry Pournelle, Spider Robinson, Dean Ing, Orson Scott Card, Poul Anderson, and Frank Herbert.

Interested?

TABLE OF CONTENTS

SCIENCE FICTION

Short Stories

THE PILOT, Joe Haldeman	100
COMPUTERIZED FIREFLIES, Stephen Kimmel	229
FLEAS, Dean Ing	295

Novelets

ENCOUNTER, Stephen Leigh	199
MALTHUS' LAST LAUGH, Eric Vinicoff and Marcia Martin	261

Novellas

SPIRALS, Larry Niven and Jerry Pournelle	8
THE STORY WRITER, Richard Wilson	108

SPECULATIVE FACT

THE PLOT (Editorial), James Baen	6
Welcome to the fun-filled conspiracy.	


NEW BEGINNINGS, J. E. Pournelle, Ph.D.	77
<i>How to Become a Space Colonist: Work hard, learn a lot, specialize—but don't overspecialize!</i>	

SPIDER VS. THE HAX OF SOL III, Spider Robinson	176
Spider has discovered a science fictional Philosopher's Stone—how, with remarkable certainty, to turn your money into good sf.	

DEFENDING THE THIRD INDUSTRIAL REVOLUTION, G. Harry Stine	236
Once you have created something valuable, you had better be able to protect it or—sure as shooting—somebody is either going to steal it or hold it for ransom.	

SCIENCE FICTION AND SCIENCE, Poul Anderson	304
<i>On Imaginary Science.</i> Part Three of a five-part series on what makes sf tick.	

Destinies



The Paperback Magazine
of Science Fiction
and Speculative Fact
April-June 1979

PUBLISHER
Thomas Doherty

Director
Ed Lenk

Art Director
Charles Volpe

Assistant Editors
Susan Allison
Ellen Kushner

EDITOR
James Patrick Baen

Published six times a year by
Ace Books, a division of
Charter Communications Inc.
A Grosset & Dunlap Company
360 Park Ave. So., New York, N.Y. 10010.

- "The Pilot" copyright © 1979 by Joe Haldeman
"Computerized Fireflies" copyright © 1979 by Stephen
Kimmel
"Fleas" copyright © 1979 by Dean Ing
"Encounter" copyright © 1979 by Stephen Leigh
"Malthus' Last Laugh" copyright © 1979 by Eric Vini-
coff and Marcia Martin
"Spirals" copyright © 1979 by Larry Niven and Jerry
Pournelle
"The Story Writer" copyright © 1979 by Richard Wilson
"New Beginnings: How to Become a Space Colonist"
copyright © 1979 by J. E. Pournelle, Ph. D.
"Spider Vs. the Hax of Sol III" (number 3) copyright ©
1979 by Spider Robinson.
"Defending the Third Industrial Revolution" copyright
© 1979 by G. Harry Stine
"Science Fiction and Science: On Imaginary Science"
copyright © 1979 by Poul Anderson

DESTINIES

The Paperback Magazine of
Science Fiction and Speculative Fact

Volume One, Number Three

Copyright © 1979 by Charter Communications Inc.

All rights reserved. No part of this book may be reproduced in any form or by any means, except for the inclusion of brief quotations in a review, without permission in writing from the publisher.

In all pieces of fiction contained in this book, all characters are fictitious. Any resemblance to actual persons, living or dead, is purely coincidental.

An ACE Book

Cover art by Dean Ellis

Interior illustrations by: David Egge, Steve Fabian, Fernando, José Gonzalez, M. Salvador, E. T. Steadman, Katrina Taylor.

Layout and Design by Steve Madison

First Ace Printing: April 1979

Printed in U.S.A.

THE PLOT

OK. It's time to come out front and admit it. The evidence is in plain sight; *Destinies* is not the fun-loving magazine of science fiction and speculative fact that it purports to be, but a tool of the Space Industrialization Conspiracy, a self-appointed organ of agitprop for high technology and space exploitation.

There are, broadly speaking, two reasons for this state of affairs. One of them is based on hard-headed liberal motivations. The other is in a more abstract, philosophical vein.

The philosophical reason is unsuitable for treatment at less than tome-length. We will but nod in passing: to the best of our certain knowledge (though not belief) mankind is the cutting edge of the universe's evident evolution toward self awareness. If the concept of "duty" has any meaning, it is ours to propagate ourselves throughout the universe so far as we are able, evolving ourselves and our artifacts the while to higher and higher levels of awareness: to be fruitful and multiply, to populate the universe. The logical outcome of this process is the integration of all mass and energy into a single entity (and what would *you* call such an entity?). This is the meaning of life.

The other reason is in a more practical vein: it seems to me that, in any society with the capacity to provide it, every person who is willing to work hard has the inalienable right to a decent life. Our

society has that capacity—but only if we continue our progress into the solar system. Without the “Third Industrial Revolution” the vast majority of people on this planet, and their progeny forever, are doomed to lives that are nasty, brutish and mercifully short.

In the process of creating technological civilization Western man has used up most of the readily available resources necessary for the maintenance, let alone the construction of the physical basis, of such a civilization. We approach pell mell the Age of Scarcity. While according to a very few technophiles there will always be enough for the Haves to keep on having—if they are sufficiently selfish and ruthless about it—there is not enough for the billions-piled-upon-billions of Have-Nots to join us. Is it too naive to say that since we of the West used up the resources *and presently are enjoying the fruits thereof*, it is our duty to replace what we have used?

We have available to us, within the solar system, mineral resources sufficient, at many times present world consumption, for hundreds of millennia. Energy sufficient for all time. And all the dirty stuff can be done Out There (if it stinks, or makes garbage—do it in orbit); Earth can once again be forests and jungles and savannahs and rolling farmland and . . . paradise redeemed, with never a smokestack or a dying river: The garden we left so long ago—but with great literature, instant communication retrieval, stereo hi fi and all the rest.

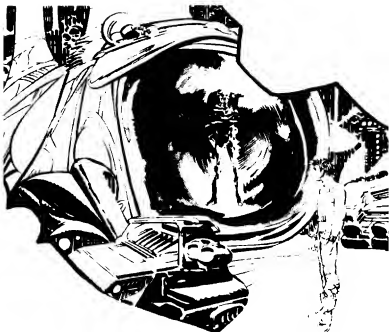
We have the ability. We have the duty. We lack, as a society, the will. Generating that will is what *Destinies* is all about. *Destinies*, the fun-filled crusade for the future of our species!



SPIRALS

by Larry Niven
and Jerry Pournelle

The men and women
responsible for making
the world a better place
are not necessarily
nice people—
just indispensable.



There are always people who want to revise history. No hero is so great that someone won't take a shot at him. Not even Jack Halfey.

Yes, I knew Jack Halfey. You may not remember my name. But in the main airlock of Industrial Station One there's an inscribed block of industrial diamond, and my name is sixth down: Cornelius L. Riggs, Metallurgist. And you might have seen my face at the funeral.

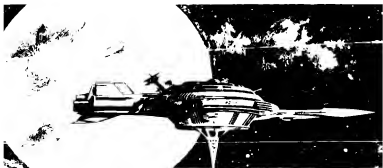
You *must* remember the funeral. All across the solar system work stopped while Jack Halfey took his final trek into the sun. He wanted it that way, and no spacer was going to refuse Jack Halfey's last request, no matter how expensive it might be. Even the downers got in the act. They didn't help pay the cost, but they spent hundreds of millions on sending reporters and cameras to the Moon.

That funeral damned near killed me. The kids who took me to the Moon weren't supposed to let the ship take more than half a gravity. My bones are over a hundred years old, and they're fragile. For that young squirt of a pilot the landing may have been smooth, but she hit a full gee for a second there, and I thought my time had come.

I had to go, of course. The records say I was Jack's best friend, the man who'd saved his life, and being one of the last survivors of the Great Trek makes me somebody special. Nothing would do but that I push the button to send Jack on his "final spiral into the sun", to quote a downer reporter.

I still see TriVee programs about ships "spiral-ing" into the sun. You'd think seventy years and more after the Great Trek the schools would teach kids something about space.

When I staggered outside in lunar gravity—lighter than the 20% gravity we keep in the Skylark, just enough to feel the difference—the reporters were all over me. Why, they demanded, did Jack want to go into the sun? Cremation and scattering of ashes is good enough for most spacers. It was good enough for Jack's wife. Some send their ashes back to Earth; some are scattered into the solar wind, to be flung throughout the universe; some



prefer to go back into the soil of a colony sphere. But why the sun?

I've wondered myself. I never was good at reading Jack's mind. The question that nearly drove me crazy, and did drive me to murder, was: why did Jack Halfey make the Great Trek in the first place?

I finally did learn the answer to that one. Be patient.

Probably there will never be another funeral like Jack's. The Big Push is only a third finished, and it's still two hundred miles of the biggest linear accelerator ever built, an electronic-powered railway crawling across the Earthside face of the Moon. One day we'll use it to launch starships. We'll fire when the Moon is full, to add the Earth's and Moon's orbital velocities to the speed of the starship, and to give the downers a thrill. But we launched Jack when the Moon was new, with pre-

cisely enough velocity to cancel the Earth's orbital speed of eighteen miles per second. It would have cost less to send him into interstellar space.

Jack didn't drop in any spiral. The Earth went on and the coffin stayed behind, then it started to fall into the Sun. It fell ninety-three million miles just like a falling safe, except for that peculiar wiggle when he really got into the sun's magnetic field. Moonbase is going to do it again with a probe. They want to know more about that wiggle.

The pilot was a lot more careful getting me home, and now I'm back aboard the Skylark, in a room near the axis where the heart patients stay; and on my desk is this pile of garbage from a history professor at Harvard who has absolutely proved that we would have had space industries and space colonies without Jack Halfey. There are no indispensable men.

In the words of a famous American president: Bullshit! We've made all the downers so rich that they can't remember what it was like back then.

And it was grim. If we hadn't got space industries established before 2020 we'd never have been able to afford them at all. Things were that thin. By 2020 A.D. there wouldn't have been any resources to invest. They'd have all gone into keeping eleven billion downers alive (barely!) and anybody who proposed "throwing money into outer space" would have been lynched.

God knows it was that way when Jack Halfey started.

I first met Jack Halfey at UCLA. He was a grad student in architecture, having got his engineering physics degree from Cal Tech. He'd also been in-

volved in a number of construction jobs—among them Hale Observatory's big orbital telescope while he was still an undergrad at Cal Tech—and he was already famous. Everyone knows he was brilliant, and they're right, but he had another secret weapon: he worked his arse off. He had to. Insomnia. Jack couldn't sleep more than a couple of hours a night, and to get even that much sleep he had to get laid first.

I know about this because when I met Jack he was living with my sister. Ruthie told me that they'd go to bed, and Jack would sleep a couple of hours, and up he'd be, back at work, because once he woke up there was no point in lying in bed.

On nights when they couldn't make out he never went to bed at all, and he was pure hell to live with the next day.

She also told me he was one mercenary son of a bitch. That doesn't square with the public image of Jack Halfey, savior of mankind, but it happens to be true, and he never made much of a secret of it. He wanted to get rich fast. His ambition was to lie around Rio de Janeiro's beaches and sample the local wines and women; and he had his life all mapped out so that he'd be able to retire before he was forty.

I knew him for a couple of months, then he left UCLA to be a department head in the construction of the big Tucson arcology. There was a tearful scene with Ruthie: she didn't fit into Jack's image for the future, and he wasn't very gentle about how he told her he was leaving. He stormed out of her apartment carrying his suitcase while Ruthie and I shouted curses at him, and that was that.

I never expected to see him again.



When I graduated there was this problem: I was a metallurgist, and there were a lot of us. Metallurgists had been in big demand when I started UCLA, so naturally everybody studied metallurgy and materials science; by the time I graduated it was damned tough getting a job.

The depression didn't help much either. I graduated right in the middle of it. Runaway inflation, research chopped to the bone, environmentalists and Only One Earthers and Friends of Man and the Earth and other such yo-yo's on the rise; in those days there was a new energy crisis every couple of years, and when I got my sheepskin we were in the middle of, I think, number 6. Industry was laying off, not hiring.

There was one job I knew of. A notice on the UCLA careers board. "Metallurgist wanted. High pay, long hours, high risk. Guaranteed wealthy in ten years if you live through it."

That doesn't sound very attractive just now, but in those days it looked better. Better than welfare, anyway, especially since the welfare offices were having trouble meeting their staff payrolls, so there wasn't a lot left over to hand out to their clients.

So, I sent in an application and found myself one of about a hundred who'd got past the paperwork screening. The interview was on campus with a standard personnel officer type who seemed more interested in my sports record than my abilities as a metallurgist. He also liked my employment history: I'd done summer jobs in heavy steel construction. He wouldn't tell me what the job was for.

"Not secret work," he said. "But we'd as soon not let it out to anyone we're not seriously interested in." He smiled and stood up, indicating the inter-

view was over. "We'll let you know."

A couple of days later I got a call at the fraternity house. They wanted me at the Wilshire headquarters of United Space Industries.

I checked around the house but didn't get any new information. USI had contracts for a good bit of space work, including the lunar mines. Maybe that's it, I thought. I could hope, anyway.

When I got to USI the receptionist led me into a comfortable room and asked me to sit down in a big Eames chair. The chair faced an enormous TV screen (flat: TriVee wasn't common in those days. Maybe it was before TriVee at all; it's been a long time, and I don't remember). She typed something on an input console, and we waited a few minutes, and the screen came to life.

It showed an old man floating in mid-air.

The background looked like a spacecraft, which wasn't surprising. I recognized Admiral Robert McLeve. He had to be eighty or more, but he didn't look it.

"Good morning," he said.

The receptionist left. "Good morning," I told the screen. There was a faint red light on a lens by the screen, and I assumed he could see me as well as I could see him. "I'd kind of hoped for the Moon. I didn't expect the O'Neill colony," I added.

It took a while before he reacted, confirming my guess: a second and a half each way for the message, and the way he was floating meant zero gravity. I couldn't think of anything but the Construction Shack (that's what they called it then) that fit the description.

"This is where we are," McLeve said. "The duty tour is five years. High pay, and you save it all. Not



much to spend money on out here. Unless you drink. Good liquor costs like transplant rights on your kidneys. So does bad liquor, because you still have to lift it."

"Savings don't mean much," I said.

"True." McLeve grimaced at the thought. Inflation was running better than 20%. The politicians said they would have it whipped Real Soon Now, but nobody believed them. "We've got arrangements to have three quarters of your money banked in Swiss francs. If you go back early, you lose that part of your pay. We need somebody in your field, part time on the Moon, part time up here in the Shack. From your record I think you'd do. Still want the job?"

I wanted it all right. I was never a nut on the space industries bit—I was never a nut on

anything—but it sounded like good work. Exciting, a chance to see something of the solar system (well, of near-Earth space and the Moon; nobody had gone further than that) as well as to save a lot of money. And with that job on my record I'd be in demand when I came home.

As to why me, it was obvious when I thought about it. There were lots of good metallurgists, but not many had been finalists in the Olympic gymnastics team trials. I hadn't won a place on the team, but I'd sure proved I knew how to handle myself. Add to that the heavy construction work experience and I was a natural. I sweated out the job appointment, but it came through, and pretty soon I was at Canaveral, strapping myself into a Shuttle seat, and having second and third thoughts about the whole thing.

There were five of us. We lifted out from the Cape in the Shuttle, then transferred in Earth orbit to a tug that wasn't a lot bigger than the old Apollo capsules had been. The trip was three days, and crowded. The others were going to Moon base. They refueled my tug in lunar orbit and sent me off alone to the Construction Shack. The ship was guided from the Shack, and it was scary as hell because there wasn't anything to do but wonder if they knew what they were doing. It took as long to get from the Moon to the Shack as it had to get to the Moon from Earth, which isn't surprising because it's the same distance: the Shack was in one of the stable libration points that make an equilateral triangle with the Earth and the Moon. Anything put there will stay there forever.

The only viewport was a small thing in the forward end of the tug. Naturally we came in ass-



backwards so I didn't see much.

Today we call it the Skylark, and what you see as you approach is a sphere half a kilometer across. It rotates every two minutes, and there's all kinds of junk moored to the axis of rotation. Mirrors, the laser and power targets, the long thin spine of the mass driver, the ring of agricultural pods, the big telescope; a confusion of equipment.

It wasn't that way when I first saw it. The sphere was nearly all there was, except for a spiderweb framework to hold the solar power panels. The frame was bigger than the sphere, but it didn't look very substantial. At first sight the Shack was a pebbled sphere, a golf ball stuck in a spider's web.

McLeve met me at the airlock. He was long of limb, and startlingly thin, and his face and neck were a maze of wrinkles. But his back was straight, and when he smiled the wrinkles all aligned themselves. Laugh-lines.

Before I left Earth I read up on his history: Annapolis, engineer with the space program (didn't make astronaut because of his eyes); retired with a bad heart; wrote a lot of science fiction. I'd read most of his novels in high school, and I suppose half the people in the space program were pulled in by his stories.

When his wife died he had another heart attack. The Old Boys network came to the rescue. His classmates wangled an assignment in space for him. He hadn't been to Earth for seven years, and low gravity was all that kept him alive. He didn't even dare go to the Moon. A reporter with a flair for mythological phraseology called him "The Old Man of Space." It was certain that he'd never go home again, but if he missed Earth he didn't show

it.

"Welcome aboard." He sounded glad to see me. "What do they call you?" he asked.

A good question. Cornelius might sound a dignified name to a Roman, but it makes for ribald comments in the USA. "Corky," I told him. I shrugged, which was a mistake: we were at the center of the sphere, and there wasn't any gravity at all. I drifted free from the grabhandle I'd been clinging to and drifted around the airlock.

After a moment of panic it turned out to be fun. There hadn't been room for any violent maneuvers in the tug, but the airlock was built to get tugs and rocket motors inside for repairs; it was big, nine meters across, and I could twirl around in the zero gravity. I flapped my arms and found I could swim.

McLeve was watching with a critical air. He must have liked what he saw because he grinned slightly. "Come on," he said. He turned in the air and drifted without apparent motion—it looked like levitation. "I'll show you around." He led the way out of the airlock into the sphere itself.

We were at the center of rotation. All around, above and below, were fields of dirt, some plowed, some planted with grass and grains.

There were wings attached to hooks at the entrance. McLeve took down a set and began strapping them on. Black bat wings. They made him look like a fallen angel, Milton's style. He handed me another pair. "Like to fly?" he asked.

I returned the grin. "Why not?" I hadn't the remotest idea of what I was doing, but if I could swim in the air with my hands, I ought to be able to handle wings in no gravity. He helped me strap in, and when I had them he gave some quick instruc-

tions.

"Main thing is to stay high," he said. "The further down the higher the gravity, and the tougher it is to control these things." He launched himself into space, gliding across the center of the sphere. After a moment I followed him.

I was a tiny chick in a vast eggshell. The landscape was wrapped around me: fields and houses, and layout yards of construction gear, and machinery, and vats of algae, and three huge windows opening on blackness. Every direction was down, millions of light years down when a window caught my attention. For a moment that was terrifying. But McLeve held himself in place with tiny motions of his wings, and his eyes were on me. I swallowed my fear and looked.

There were few roads. Mostly the colonists flew with their wings, flew like birds, and if they didn't need roads, they didn't need squared-off patterns for the buildings either. The "houses" looked like they'd been dropped at random among the green fields. They were fragile partitions of sheet metal (wood was far more costly than sheet steel here), and they could not have borne their own weight on Earth, let alone stand up to a stiff breeze. They didn't have to. They existed for privacy alone.

I wondered about the weather. Along the axis of the sphere I could see scores of white puffballs. Clouds? I gathered my courage and flapped my way over to the white patch. It was a flock of hens. Their feet were drawn up, their heads were tucked under their wings, and they roosted on nothing.

"They like it in zero gravity," McLeve said. "Only thing is, when you're below them you have to watch out."

He pointed. A blob of chicken splat had left the flock and moved away from us. It fell in a spiral pattern. Of course the splat was actually going in a straight line—we were the ones who were rotating, and that made the falling stuff look as if it were spiraling to the ground below.

"Automatic fertilizer machine," I said.

McLeve nodded.

"I wonder you don't keep them caged," I said.

"Some people like their sky dotted with fleecy white hens."

"Oh. Where is everybody?" I asked.

"Most are outside working," McLeve said. "You'll meet them at dinner."

We stayed at the axis, drifting with the air currents, literally floating on air. I knew already why people who came here wanted to stay. I'd never experienced anything like it, soaring like a bird. It wasn't even like a sail plane: you wore the wings and you flew with them, you didn't sit in a cockpit and move controls around.

There were lights along part of the axis. The mirrors would take over their job when they were installed; for the moment the lights ran off solar power cells plastered over the outside of the sphere. At the far end of the sphere was an enormous cloud of dust. We didn't get close to it. I pointed and looked a question.

"Rock grinder," McLeve said. "Making soil. We spread it over the northern end." He laughed at my frown. "North is the end toward the sun. We get our rocks from the Moon. It's our radiation shielding. Works just as well if we break it up and spread it around, and that way we can grow crops in it. Later on we'll get the agricultural compartments built,

but there's always five times as much work as we have people to do it with."

They'd done pretty well already. There was grass, and millet and wheat for the chickens, and salad greens and other vegetable crops. Streams ran through the fields down to a ring-shaped pond at the equator. There was also a lot of bare soil that had just been put in place and hadn't been planted. The Shack wasn't anywhere near finished.

"How thick is that soil?" I asked.

"Not thick enough. I was coming to that. If you hear the flare warnings, get to my house. North pole."

I thought that one over. The only way to ward yourself from a solar flare is to put a lot of mass between you and the sun. On Earth that mass is a hundred miles of air. On the Moon they burrow ten meters into the regolith. The Shack had only the rock we could get from the Moon, and Moonbase had problems of its own. When they had the manpower and spare energy they'd throw more rock our way, and we'd plaster it across the outer shell of the Shack, or grind it up and put it inside; but for now there wasn't enough, and come flare time McLeve was host to an involuntary lawn party.

But what the hell, I thought. It's beautiful. Streams rushing in spirals from pole to equator. Green fields and houses, skies dotted with fleecy white hens; and I was flying as man flies in dreams.

I decided it was going to be fun, but there was one possible hitch.

"There are only ten women aboard," I said.

McLeve nodded gravely.

"And nine of them are married."

He nodded again. "Up to now we've mostly



needed muscle. Heavy construction experience and muscle. The next big crew shipment's in six months, and the company's trying like hell to recruit women to balance things off. Think you can hold out that long?"

"Guess I have to."

"Sure. I'm old navy. We didn't have women aboard ships and we lived through it."

I was thinking that I'd like to meet the one unmarried woman aboard. Also that she must be awfully popular. McLeve must have read my thoughts, because he waved me toward a big structure perched on a ledge partway down from the north pole. "You're doing all right on the flying. Take it easy and let's go over there."

We soared down, and I began to feel a definite "up" and "down"; before that any direction I wanted it to be was "up." We landed in front of the

building.

"Combination mess hall and administration offices," McLeve said. "Ten percent level."

It took a moment before I realized what he meant. Ten percent level—ten percent of Earth's gravity.

"It's as heavy as I care to go," McLeve said. "And any lighter makes it hard to eat. The labs are scattered around the ring at the same level."

He helped me off with my wings and we went inside. There were several people, all men, scurrying about purposefully. They didn't stop to meet me.

They weren't wearing much, and I soon found that was the custom in the Shack; why wear clothes inside? There wasn't any weather. It was always warm and dry and comfortable. You mostly needed clothes for pockets.

At the end of the corridor was a room that hummed; inside there was a bank of computer screens, all active. In front of them sat a homely girl.

"Miss Hoffman," McLeve said. "Our new metallurgist, Corky Riggs."

"Hi." She looked at me for a moment, then back at the computer console. She was mumbling something to herself as her fingers flew over the keys.

"Dot Hoffman is our resident genius," McLeve said. "Anything from stores and inventories to orbit control, if a computer can figure it out she can make the brains work the problem."

She looked up with a smile. "We give necessity the praise of virtue," she said.

McLeve looked thoughtful. "Cicero?"

"Quintilian." She turned back to her console again.

"See you at dinner," McLeve said. He led me out.

"Miss Hoffman," I said.

He nodded.

"I suppose she wears baggy britches and blue wool stockings and that shirt because it's cool in the computer room," I said.

"No, she always dresses that way."

"Oh."

"Only six months, Riggs," the admiral said. "Well, maybe a year. You'll survive."

I was thinking I'd damned well have to.

I fell in love during dinner.

The chief engineer was named Ty Plauger, a long, lean chap with startling blue eyes. The chief ecologist was his wife, Jill. They had been married about a year before they came up, and they'd been aboard the Shack for three, ever since it started up. Neither was a lot older than me, maybe thirty then.

At my present age the concept of love at first sight seems both trite and incredible, but it was true enough. I suppose I could have named you reasons then, but I don't feel them now. Take this instead:

There were ten women aboard out of ninety total. Nine were married, and the tenth was Dot Hoffman. My first impression of her was more than correct. Dot never would be married. Not only was she homely, but she thought she was homelier still. She was terrified of physical contact with men, and the blue wool stockings and blouse buttoned to the neck were the least of her defenses.

If I had to be in love—and at that age, maybe I did—I could choose among nine married women. Jill was certainly the prettiest of the lot. Pug nose, brown hair chopped off short, green eyes, and a

compact muscular shape, very much the shape of a woman. She liked to talk, and I liked to listen.

She and Ty had stars in their eyes. Their talk was full of what space would do for mankind.

Jill was an ex-Fromate; she'd been an officer in the Friends of Man and the Earth. But while the Fromates down below were running around sabotaging industries and arcologies and nuclear plants and anything else they didn't like, Jill went to space. Her heart bled no less than any for the baby fur seals and the three-spined stickleback and all the fish killed by mine tailings, but she'd thought of something to do about it all.

"We'll put all the dirty industries into space," she told me. "Throw the pollution into the solar wind and let it go out to the cometary halo. The Fromates think they can talk everyone into letting Kansas go back to buffalo grass—"

"You can't *make* people want to be poor," Ty put in.

"Right! If we want to clean up the Earth and save the wild things, we'll have to give people a way to get rich without harming the environment. This is it! Some day we'll send down enough power from space that we can tear down the dams and put the snail darter back where he came from."

And more. Jill tended to do most of the talking. I wondered about Ty. He always seemed to have the words that would set her off again.

And one day, when we were clustered around McLeve's house with, for a few restful hours, nothing to do, and Jill was well out of earshot flying around and among the chickens in her wonderfully graceful wingstyle, Ty said to me, "I don't *care* if we turn the Earth into a park. I like space. I like

flying, and I like free fall, and the look of stars with no air to cloud them. But don't tell Jill."

I learned fast. With Ty in charge of engineering, McLeve as chief administrator, and Dot Hoffman's computers to simulate the construction and point up problems before they arose, the project went well. We didn't get enough mass from the Moon, so that my smelter was always short of raw materials, and Congress didn't give us enough money. There weren't enough flights from down below and we were short of personnel and goods from Earth. But we got along.

Two hundred and forty thousand miles below us, everything was going to hell.

First, the senior senator from Wisconsin lived long enough to inherit a powerful committee chairmanship, and he'd been against the space industries from the start. Instead of money we got "Golden Fleece" awards. Funds already appropriated for flights we'd counted on got sliced, and our future budgets were completely in doubt.

Next, the administration tried to bail itself out of the tax revolt by running the printing presses. What money we could get appropriated wasn't worth half as much by the time we got it.

Moonbase felt the pinch and cut down even more on the rock they flung out our way.

Ty's answer was to work harder: get as much of the Shack finished as we could, so that we could start sending down power.

"Get it done," he told us nightly. "Get a *lot* of it finished. Get so much done that even those idiots will see that we're worth it. So much that it'll cost them less to supply us than to bring us home."



He worked himself harder than anyone else, and Jill was right out there with him. The first task was to get the mirrors operating.

We blew them all at once over a couple of months. They came in the shuttle that should have brought our additional crew; it wasn't much of a choice, and we'd have to put off balancing out the sex ratio for another six months.

The mirrors were packages of fabric as thin as the cellophane on a package of cigarettes. We inflated them into great spheres, sprayed foam plastic on the outside for struts, and sprayed silver vapor inside where it would precipitate in a thin layer all over. Then we cut them apart to get spherical mirrors, and sliced a couple of those into wedges to mount behind the windows in the floor of the Shack.

They reflected sunlight in for additional crops.

Jill had her crew out planting more wheat to cut down on the supplies we'd need from Earth.

Another of the mirrors was my concern. A hemisphere a quarter of a kilometer across can focus a lot of sunlight onto a small point. Put a rock at that point and it melts, fast. When we got that set up we were all frantically busy smelting iron for construction out of the rocks. Moonbase shipped up when they could. When Moonbase couldn't fling us anything we dismounted rock we'd placed for shielding, smelted it, and plastered the slag back onto the sphere.

Days got longer and longer. There's no day or night aboard the Shack anyway, of course: open the mirrors and you have sunlight, close them and you don't. Still, habit dies hard, and we kept track of time by days and weeks; but our work schedules bore no relation to them. Sometimes we worked the clock around, quitting only when forced to by sheer exhaustion.

We got a shipment from Moonbase, and in the middle of the refining process the mounting struts in the big smelter mirror got out of alignment. Naturally Ty was out to work on it.

He was inspecting the system by flying around with a reaction pistol. The rule was that no one worked without a safety line; a man who drifted away from the Shack might or might not be rescued, and the rescue itself would cost time and manpower we didn't have.

Ty's line kept pulling him up short of where he wanted to go. He gave the free end to Jill and told her to pay out a lot of slack. Then he made a jump from the mirror frame. He must have thought he'd use the reaction pistol to shove him off at an angle

so that he'd cross over the bowl of the mirror to the other side.

The pistol ran out of gas. That left Ty floating straight toward the focus of the mirror.

He shouted into his helmet radio, and Jill frantically hauled in slack, trying to get a purchase on him. I made a quick calculation and knew I would never reach him in time; if I tried I'd likely end up in the focus myself. Instead I took a dive across his back path. If I could grab his safety line, the jerk as I pulled up short ought to keep him out of the hottest area, and my reaction pistol would take us back to the edge.

I got the line all right, but it was slack. It had burned through. Ty went right through the hot point. When we recovered his body, metal parts on his suit had melted.

We scattered his ashes inside the sphere. McLeve's navy prayer book opened the burial service with the words "We brought nothing into this world, and it is certain that we shall take nothing out." Afterwards I wondered how subtle McLeve had been in his choice of that passage.

We had built this world ourselves, with Ty leading us. We had brought *everything* into this world, even down to Ty's final gift to us; the ashes which would grow grass in a place no human had ever thought to reach until now.

For the next month we did without him; and it was as if we had lost half our men. McLeve was a good engineer if a better administrator, but he couldn't go into the high gravity areas, and he couldn't do active construction work. Still, it wasn't engineering talent we lacked. It was Ty's drive.

Jill and Dot and McLeve tried to make up for that. They were more committed to the project than ever.

Two hundred and forty thousand miles down, they were looking for a construction boss. They'd find one, we were sure. We were the best, and we were paid like the best. There was never a problem with salaries. Salaries were negligible next to the other costs of building the Shack. But the personnel shuttles were delayed, and delayed again, and we were running out of necessities, and the US economy was slipping again.

We got the mirrors arrayed. Jill went heavily into agriculture, and the lunar soil bloomed, seeded with earthworms and bacteria from earthly soil. We smelted more of the rocky crust around the Shack and put it back as slag. We had plans for the metal we extracted, starting with a lab for growing metal whiskers. There was already a whisker lab in near-Earth orbit, but its output was tiny. The Shack might survive if we could show even the beginnings of a profit-making enterprise.

Jill had another plan: mass production of expensive biologicals, enzymes and various starting organics for ethical drugs.

We had lots of plans. What we didn't have was enough people to do it all. You can only work so many twenty-hour days. We began to make mistakes. Some were costly.

My error didn't cost the Shack. Only myself. I like to think it was due to fatigue and nothing more.

I made a try at comforting the grieving widow, after a decent wait of three weeks.

When Ty was alive everyone flirted with Jill. She pretended not to notice. You'd have to be crude as

well as rude before she'd react.

This time it was different. I may not have been very subtle, but I wasn't crude; and she told me instantly to get the hell out of her cabin and leave her alone.

I went back to my refinery mirror and brooded.

Ninety years later I know better. Ninety years is too damned late. If I'd noticed nothing else, I should have known that nearly eighty unmarried men aboard would all be willing to comfort the grieving widow, and half of them were only too willing to use the subtle approach: "You're all that keeps us working so hard."

I wonder who tried before I did? It hardly matters; when my turn came, Jill's reaction was automatic. Slap him down before it's too late for him to back away. And when she slapped me down, I stayed slapped, more hurt than mad, but less than willing to try again.

I hadn't stopped being in love with her. So I worked at being her friend again. It wasn't easy. Jill was cold inside. When she talked to people it was about business, never herself. Her dedication to the Shack, and to all it stood for in her mind, was hardening, ossifying. And she spent a lot of time with Dot Hoffman and Admiral McLeve.

But the word came: another shuttle. Again there were no women. The Senator from Wisconsin had found out how expensive it would be to get us home. Add fifty women and it would be half again as expensive. So no new personnel.

Still they couldn't stop the company from sending up a new chief engineer, and we heard the shuttle was on its way, with a load of seeds, liquid hydrogen, vitamin pills, and Jack Halfey.

I couldn't believe it. Jack just wasn't the type.

To begin with, while the salary you could save in five years amounted to a good sum, enough to let you start a business and still have some income left, it wasn't *wealth*. You couldn't live the rest of your life in Rio on it; and I was pretty sure Jack's goals hadn't changed.

But there he was, the new boss. From the first day he arrived things started humming. It was the old Jack, brilliant, always at work, and always insisting everyone try to keep up with him although no one ever could. He worked our arses off. In two months he had us caught up on the time we lost after Ty was killed.

Things looked good. They looked damned good. With the mirrors mounted we could operate on sunlight, with spare power for other uses. Life from soil imported from Earth spread throughout the soil imported from the Moon; and earthly plants were in love with the chemicals in lunar soil. We planted strawberries, corn and beans together; we planted squashes and melons in low-gravity areas and watched them grow into jungles of thin vines covered with fruit.

The smelter worked overtime, and we had more than enough metals for the whisker lab and biological vats, if only a shuttle would bring us the pumps and electronics we needed; and if necessary we'd make pumps in the machine shops, and Jack had Dot working out the details of setting up integrated-circuit manufacture.

But the better things looked in space, the worse they looked on Earth.

One of the ways we were going to make space



colonies pay for themselves was through electricity. We put out big arrays of solar cells, monstrous spiderwebs a kilometer long by half that wide, so large that they needed small engines dotted all over them just to keep them oriented properly toward the sun.

We made the solar cells ourselves; one of the reasons they needed me was to get out the rare metals from the lunar regolith and save them for the solar-cell factory. And it was working; we had the structure and we were making the cells. Soon enough we'd have enormous power, megaWatts of power, enough to beam it down to Earth where it could pay back some of the costs of building the system. The orbiting power stations cost a fortune to put up, but not much to maintain; they would be like dams, big front end costs but then nearly free power forever.

We were sure that would save us. How could the United States turn down free electricity?

It looked good until the Fromates blew up the desert antenna that we would have been beaming the power down to, and the lawyers got their reconstruction tied into legal knots that would probably take five years to untangle.

The Senator from Wisconsin continued his crusade. This time we got *three* Golden Fleece awards. Down on Earth the company nominated him for membership in the Flat Earth Society. He gleefully accepted and cut our budget again.

We also had problems on board. Jack had started mean; it was obvious he had never wanted to come here in the first place. Now he turned mean as a rattlesnake. He worked us. If we could get the whisker lab finished ahead of time, at lower cost than planned, then maybe we could save the station yet; so he pushed and pushed again; and one day he pushed too hard.

It wasn't a mutiny. It wasn't even a strike. We all did a day's work; but suddenly, without as far as I know any discussion among us, nobody would put in overtime. Ten hours a day, yes; ten hours and one minute, no.

Jill pleaded. The Admiral got coldly formal. Dot cried. Jack screamed.

We cut work to nine and a half hours.

And then it all changed. One day Jack Halfey was smiling a lot. He turned polite. He was getting his two or three hours sleep a night.

Dot described him. "Like Mrs. Fezziwig," she said. "'One vast substantial smile.' I hope she's happy. I wonder why she did it? To save the

Shack. . . ." She was trying to keep her voice cheerful, but her look was bitter. Dot wasn't naive; just terrified. I suppose that to her the only reason a woman would move in with a man would be to save some noble cause like the Shack.

As to Jill, she didn't change much. The Shack was the first step in the conquest of the universe, and it was by God going to be finished and self-sufficient. Partly it was a memorial to Ty, I think; but she really believed in what she was doing, and it was infectious.

I could see how Jack could convince her that he shared her goal. To a great extent he did, although it was pure selfishness; his considerable reputation was riding on this project. But Jack never did anything half-heartedly. He drove himself at whatever he was doing.



What I couldn't understand was why he was here at all. He must have *known* how thin were the chances of completing the Shack before he left Earth.

I had to know before it drove me nuts.

Jack didn't drink much. When he did it was often a disaster, because he was the world's cheapest drunk. So one night I plied him.

Night is generally relative, of course, but this one was real: the Earth got between us and the sun. Since we were in the same orbit as the Moon, but sixty degrees ahead, that happened to us exactly as often as there are eclipses of the moon on Earth; a rare occasion, one worth celebrating.

Of course we'd put in a day's work first, so the party didn't last long; we were all too beat. Still it was a start, and when the formalities broke up and Jill went off to look at the air system, I grabbed Jack and got him over to my quarters. We both collapsed in exhaustion.

I had brought a yeast culture with me from Canaveral. McLeve had warned me that liquor cost like diamonds up here; and a way to make my own alcohol seemed a good investment. And it was. By now I had vacuum distilled vodka made from fermented fruit bars and a mash of strawberries from the farm—they weren't missed; the farm covered a quarter of the inner surface now. My concoction tasted better than it sounds, and it wasn't hard to talk Jack into a drink, then another.

Presently he was trying to sing the verses to "The Green Hills of Earth." A mellower man you never saw. I seized my chance.

"So you love the green hills of Earth so much,

what are you doing here? Change your mind about Rio?"

Jack shook his head; the vibration ran down his arm and sloshed his drink. "Nope . . ." Outside a hen cackled, and Jack collapsed in laughter. "Let me rest my eyes on the fleecy skies . . ."

Grimly I stuck to the subject. "I thought you were all set with that Tucson arcology."

"Oh, I was. I was indeed. It was a *beautiful* setup. Lots of pay, and—" He stopped abruptly.

"And other opportunities?" I was beginning to see the light.

"Welllll . . . yes. But you have to see it the way I did. First, it was a great opportunity to make a name for myself. A city in a building! Residential and business and industry all in the same place, one building to house a quarter . . . of a million . . .



people. And it would have been beautiful, Corky. The plans were magnificent! I was in love with it. Then I got into it, and I saw what was really going on.

"Corky, everyone was stealing that place blind! The first week I went to the chief engineer to report shortages in deliveries and he just looked at me. 'Stick to your own work, Halfey,' says he. Chief engineer, the architects, construction bosses, even the catering crew—every one of them was knocking down twenty-five, fifty percent! They were selling the cement right off the boxcars and substituting sand. There wasn't enough cement in that concrete to hold up the walls."

"So you took your share."

"Don't get holy on me! Dammit, look at it my way. I was willing to play square, but they wouldn't let me. The place was going to fall down. The weight of the first fifty thousand people would have done it. What I could do was make sure nobody got inside before it happened." Jack Halfey chortled. "I'm a public benefactor, I am. I sold off the reinforcing rods. The inspectors couldn't possibly ignore that."

"Nothing else?" I asked.

"Welllll, those rods were metal-whisker compote. Almost as strong as diamond, and almost as expensive. I didn't need anything else. But I made sure they'd never open that place to the public. Then I stashed my ill-gotten gains and went underground and waited for something to happen."

"I never heard much about it. Of course, I wouldn't, up here."

"Not many down there heard either. Hush hush while the FBI looked into it. The best buy I ever made in my life was a subscription to the *Wall*



Street Journal. Just a paragraph about how the Racket Squad was investigating Mafia involvement in the Tucson arcology. That's when things fell into place."

I swung around to refill his glass, carefully. We use great big glasses, and never fill them more than half full. Otherwise they slosh all over the place in the low gravity. I had another myself. It was pretty good vodka, and if I felt it, Jack must be pickled blue. "You mean the building fell in?"

"No, no. I realized why there was so *much* graft." Jack sounded aggrieved. "There was supposed to be graft. I wasn't supposed to get in on it."

"Aha."

"Aha you know it. I finished reading that article on a plane to Canaveral. The FBI couldn't follow me to Rio, but the Mafia sure could. I'd heard there was a new opening for chief engineer for the Construction Shack, and all of a sudden the post looked very, very good."

He chuckled. "Also, I hear that things are tightening up in the USA. Big crackdown on organized crime. Computer-assisted. Income tax boys and Racket Squad working together. It shouldn't be long before all the chiefs who want my arse are in jail. Then I can go back, cash my stash, and head for Rio."

"Switzerland?"

"Oh, no. Nothing so simple as that. I thought of something else. Say, I better get back to my bunk." He staggered out before I could stop him. Fortunately it was walking distance from my place to his; if he'd had to fly, he'd probably have ended up roosting with the chickens.

"Bloody hell," says I to myself.

Should I add that I had no intention of robbing Jack? I was just curious: what inflation-proof investment had he thought up? But I didn't find out for a long time .

A month later the dollar collapsed. Inflation had been a fact of life for so long that it was the goal of every union and civil service organizer to get inflation written into their contracts, thereby increasing inflation. The government printed money faster to compensate: more inflation. One of those vicious spirals. Almost suddenly, the dollar was down the drain.

There followed a full-scale taxpayer revolt.

The Administration got the message: they were spending too much money. Aha! Clearly that had to stop. The first things to go were all the projects that wouldn't pay off during the current President's term of office. Long term research was chopped out of existence. Welfare, on the other hand, was increased, and a comprehensive National Health Plan was put into effect, even though they had to pay the doctors and hospitals in promissory notes.

The Senator from Wisconsin didn't even bother giving us his customary Golden Fleece Award. Why insult the walking dead?

We met in our usual place, a cage-work not far from the north pole. Admiral McLeve was in the center, in zero gravity. The rest of us perched about the cage-work, looking like a scene from Hitchcock's *The Birds*.

Dot had a different picture, from Aristophanes. "Somewhere, what with all these clouds and all this air, There must be a rare name, somewhere . . . How do you like Cloud-Cuckoo-Land?



Putting on wings does things to people. Halfey had dyed his wings scarlet, marked with yellow triangles enclosing an H. Dot wore the plumage of an eagle, and I hadn't believed it the first time I saw it; it was an incredibly detailed, beautiful job. McLeve's were the wings of a bat, and I tell you he looked frightening, as evil as Dracula himself. Leon Briscoe, the chemist, had painted mathematical formulae all over his, in exquisite medieval calligraphy. Jill and Ty had worn the plumage of male and female Least Terns, and she still wore hers. There were no two sets of wings alike in that flock. We were ninety birds of ninety species, all gathered as if the ancient roles of predator and prey had been set aside for a larger cause. Cloud-Cuckoo-Land.

A glum Cloud-Cuckoo-Land.

"It's over," McLeve said. "We've been given three

months to phase out and go home. Us, Moonbase, the whole space operation. They'll try to keep some of the near-Earth operations going a while longer, but we're to shut down."

Nobody said anything at first. We'd been expecting it, those of us who'd had time to follow news from Earth. Now it was here, and nobody was ready. I thought about it: back to high gravity again. Painful.

And Jill. Her dream was being shot down. Ty died for nothing. Then I remembered McLeve. He wasn't going anywhere. Any gravity at all was a death sentence.

And I hated Jack Halfey for the grin he was hiding. There had been a long piece in the latest newscast about the roundup of the Mafia lords; grand juries working overtime, and the District of Columbia jail filled, no bail to be granted. It was safe for Jack down there, and now he could go home early.

"They can't do this to us!" Jill wailed. A leftover Fromate reflex, I guess. "We'll—" Go on strike? Bomb something? She looked around at our faces, and when I followed the look I stopped with Dot Hoffman. The potato face was withered in anguish, the potato eyes were crying. What was there for Dot on Earth?

"What a downer," she said.

I almost laughed out loud, the old word was so inadequate. Then McLeve spoke in rage. "Downers. Yes. Nine billion downers sitting on their fat arses while their children's future slides into the muck. Downers is what they are."

Now you know. McLeve the wordsmith invented that word, on that day.

My own feelings were mixed. Would the money

stashed in Swiss francs be paid if we left early, even though we had to leave? Probably, and it was not a small amount; but how long would it last? There was no job waiting for me . . . but certainly I had the reputation I'd set out for. I shouldn't have much trouble getting a job.

But I like to finish what I start. The Shack was *that* close to being self-sufficient. We had the solar power grids working. We even had the ion engines mounted all over the grid to keep it stable. We didn't have the microwave system to beam the power back to Earth, but it wouldn't be that expensive to put in . . . except that Earth had no antennae to receive the power. They hadn't even started reconstruction. The permit hearings were tied up in lawsuits.

No. The Shack was dead. And if our dollars were worthless, there were things that weren't. Skilled labor *couldn't* be worthless. I would get my francs, and some of my dollar salary had been put into gold. I wouldn't be broke. And—the clincher—there were women on Earth.

McLeve let us talk a while. When the babble died down and he found a quiet lull, he said, very carefully, "Of course, we have a chance to keep the station going."

Everyone talked at once. Jill's voice came through loudest. "How?"

"The Shack was designed to be a self-sufficient environment," McLeve said. "It's not quite that yet, but what do we need?"

"Air," someone shouted.

"Water," cried another.

I said, "Shielding. It would help to have enough mass to get us through a big solar flare. If they're

shutting down Moonbase we'll never have it."

Jill's voice carried like a microphone. "Rocks? Is that all we need? Ice and rocks? We'd have both in the asteroid belt." It was a put-up job. She and McLeve must have rehearsed it.

I laughed. "The Belt is two hundred million miles away. We don't have ships that will go that far, let alone cargo . . . ships . . ." And then I saw what they had in mind.

"Only one ship," McLeve said. "The Shack itself. We can move it out into the Belt."

"How long?" Dot demanded. Hope momentarily made her beautiful.

"Three years," McLeve said. He looked thoughtful. "Well, not quite that long."

"We can't live three years," I shouted. I turned to Jill, trusting idiot that I was then. "The air system can't keep us alive that long, can it? Not enough chemicals—"

"But we can do it!" she shouted. "It won't be easy, but the farm is growing now. We have enough plants to make up for the lack of chemical air purification. We can recycle everything. We've got the raw sunlight of space. Even out in the asteroids that will be enough. We can do it."

"Can't hurt to make a few plans," McLeve said.

It couldn't help either, thought I; but I couldn't say it, not to Dot and Jill.

II

These four were the final architects of The Plan: Admiral McLeve, Jill Plauger, Dot Hoffman, and

Jack Halfey.

At first the most important was Dot. Moving something as large as the Shack, with inadequate engines, a house in space never designed as a ship; that was bad enough. Moving it farther than any manned ship, no matter the design, should have been impossible.

But behind that potato face was a brain tuned to mathematics. She could solve any abstract problem. She knew how to ask questions; and her rapport with computers was a thing to envy.

Personal problems stopped her cold. Because McLeve was one of the few men she could see as harmless, she could open up to him. He had told me sometime before we lost Ty, "Dot tried sex once and didn't like it." I think he regretted saying even that much. Secrets were sacred to him. But for whatever reason, Dot couldn't relate to people; and that left all her energy for work.

Dot didn't talk to women either, through fear or envy or some other reason I never knew. But she did talk to Jill. They were fanatical in the same way. It wasn't hard to understand Dot's enthusiasm for The Plan.

McLeve had no choices at all. Without the Shack he was a dead man.

Jack was in the Big Four because he was needed. Without his skills there would be no chance at all. So he was dragged into it, and we watched it happen.

The day McLeve suggested going to the asteroids, Jack Halfey was thoroughly amused, and showed his mirth to all. For the next week he was not amused by anything whatever. He was a walk-

ing temper tantrum. So was Jill. I expect he tried to convince her that with sufficient wealth, exile on Earth could be tolerable. Now he wasn't sleeping, and we all suffered.

Of course our miseries, including Jack's, were only temporary. We were all going home. All of us.

Thus we followed the downer news closely, and thus was there a long line at the communications room. Everyone was trying to find an Earthside job. It hardly mattered. There was plenty of power for communications. It doesn't take much juice to close down a colony.

We had no paper, so the news was flashed onto a TV for the edification of those waiting to use the transmitter. I was waiting for word from Inco: they had jobs at their new smelter in Guatemala. Not the world's best location, but I was told it was a tropical paradise, and the quetzal was worth at least as much as the dollar.

I don't know who Jack was expecting to hear from. He looked like a man with a permanent hang-over, except that he wasn't so cheerful.

The news, for a change, wasn't all bad. Something for everyone. The United States had issued a new currency, called "marks" (it turns out there were marks in the US during revolutionary times); they were backed by miniscule amounts of gold.

Not everyone was poor. Technology proceeded apace. Texas Instruments announced a new pocket computer, a million bits of memory and fully programmable, for twice what a calculator cost. Firestone Diamonds—which had been manufacturing flawless bluewhite diamonds in a laboratory

for the past year, and which actually was owned by a man named Firestone—had apparently swamped the engagement ring market, and was now making chandeliers. A diamond chandelier would cost half a year's salary, of course, but that was expected to go down.

The "alleged Mafia chieftains" now held without bail awaiting trial numbered in the thousands. I was surprised: I hadn't thought it would go that far. When the dollar went worthless, apparently Mafia bribe money went worthless too. Maybe I'm too cynical. Maybe there was an epidemic of righteous wrath in government.

Evidently someone thought so, because a bond issue was approved in California, and people were beginning to pay their taxes again.

Something for everyone. I thought the Mafia item would cheer Jack up, but he was sitting there staring at the screen as if he hadn't seen a thing and didn't give a damn anyway. My call was announced and I went in to talk to Inco. When I came out Jack had left, not even waiting for his own call. Lack of sleep can do terrible things to a man.

I wasn't surprised when Jack had a long talk with McLeve, nor when Jill moved back in with him. Jack would promise anything, and Jill would believe anything favorable to her mad scheme.

The next day Jack's smile was back, and if I thought it was a bit cynical, what could I do? Tell Jill? She wouldn't have believed me anyway.

They unveiled The Plan a week later. I was invited to McLeve's house to hear all about it.

Jack was there spouting enthusiasm. "Two problems," he told us. "First, keeping us alive during the

trip. That's more Jill's department, but what's the problem? The Shack was designed to last centuries. Second problem is getting out there. We've got that figured out."

I said, "The hell you do. This isn't a spaceship, it's just a habitat. Even if you had a, a big rocket motor to mount on the axis, you wouldn't have fuel for it, and if you did, the Shack would break up under the thrust." I hated him for what he was doing to Jill, and I wondered why McLeve wasn't aware of it. Maybe he was. The admiral never let anyone know what he thought.

"So we don't mount a big rocket motor," Jack said. "What we've got is just what we need: a lot of little motors on the solar panels. We use those and everything else we have. Scooters and tugs, the spare panel engines, and, last but not least, the Moon. We're going to use the Moon for a gravity sling."

He had it all diagrammed out in four colors. "We shove the Shack toward the Moon. If we aim just right, we'll skim close to the lunar surface with everything firing. We'll leave the Moon with that velocity plus the Moon's orbital velocity, and out we go."

"How close?"

He looked to Dot. She pursed her lips. "We'll clear the peaks by two kilometers."

"That's close."

"More than a mile," Jack said. "The closer we come the faster we leave."

"But you just don't have the thrust!"

"Almost enough," Jack said. "Now look. We keep the panel thrusters on full blast. That gives us about a quarter percent of a gravity, not *nearly* enough to



break up the Shack, Corky. And we use the mirrors." He poked buttons and another diagram swam onto McLeve's drafting table. "See."

It showed the Shack with the window mirrors opened all the way for maximum surface area. My smelter mirror was hung out forward. Other mirrors had been added. "Sails! Light pressure adds more thrust. Not a lot, but enough to justify carrying their mass. We can get to the Belt."

"You're crazy," I informed them.

"Probably," McLeve muttered. "But from my viewpoint it looks good."

"Sure. You're dead anyway, no offense intended. We're playing a game here, and it's getting us nowhere."

"I'm going." Jill's voice was very low and very convincing. It stirred the hair on my neck.

"Me too," Dot added. She glared at me, the

enemy.

I made one more try. They'd had more time to think about it than I did, but the thrust figures were right there, scrawled in an upper corner of the diagram. "Now pay attention. You can't possibly use the attitude jets on the solar panels for that long. They work by squirting dust through a magnetic field, throwing it backward so the reaction pushes you forward. Okay, you've got free solar power, and you can get the acceleration. But where can you possibly get enough dust?" I saw Jack's guilty grin, and finished, "Holy shit!"

Jack nodded happily.

"Why not?" Jill asked. "We won't need solar flare shielding around Ceres. On the way we can keep what we do have between us and the Sun, while we grind up the surplus."

They meant it. They were going to make dust out of the radiation shields and use that.

In theory it would work. The panel engines didn't care what was put through them; they merely charged the stuff up with electricity gathered from the solar cells and let the static charge provide the push. A rocket is nothing more than a way to squirt mass overboard; any mass will do. The faster you can throw mass away, the better your rocket.

At its simplest a rocket could be a man sitting in a bucket throwing rocks out behind him. Since a man can't throw very fast that wouldn't be a very good rocket, but it would work.

But you have to have rocks, and they were planning on using just about all of ours.

It was a one-way mission. They'd have to find an

asteroid, and fast, when they got to the Belt; by the time they arrived they'd be grinding up structure, literally taking the Shack apart, and all that would have to be replaced.

It would have to be a special rock, one that had lots of metal, and also had ice. This wasn't impossible, but it wasn't any sure thing either. We knew from Pioneer probes that some of the asteroids had strata of water ice, and various organics as well; but we couldn't tell which ones. We knew one more thing from the later probes, and The Plan was geared to take advantage of that.

The Skylark—newly named by McLave, and I've never known why he called it that—would head for Ceres. There were at least three small-hill-sized objects orbiting that biggest of the asteroids.

A big solar flare while they were out that far would probably kill the lot of them. Oh, they had a safety hole designed: a small area of the Shack to huddle inside, crowded together like sardines, and if the flare didn't last too long they'd be all right—

Except that it would kill many of the plants needed for the air supply.

I didn't think the air recycling system would last any three years either, but Jill insisted it was all right.

It didn't matter. I wasn't going, and neither was Jack; it was just something to keep Jill happy until the shuttle came.

There was more to The Plan. All the non-essential personnel would go to Moonbase, where there was a better chance. Solar flares weren't dangerous to them. Moonbase was buried under twenty feet of lunar rock and dust. They had lots of

mass. There's oxygen chemically bound in lunar rock, and if you have enough power and some hydrogen you can bake it out. They had power: big solar mirrors, not as big as ours, but big. They had rocks. The hydrogen recycles if it's air you want. If you want water, the hydrogen has to stay in the water.

We figured they could hang on for five years.

Our problem was different. If Moonbase put all its effort into survival, they wouldn't have the resources to keep sending us rocks and metal and hydrogen. Hydrogen is the most abundant element in the universe; but it's rare on the Moon. Without hydrogen you don't have water. Without water you don't have life.

I had to admit things were close. We were down to a shuttle load a month from Earth; but we needed those. They brought hydrogen, vitamins, high-protein foods. We could grow crops; but that took water, and our recycling systems were nowhere near 100% efficient.

Now the hydrogen shipments had stopped. At a cost of fifty million dollars a flight before the dollar collapsed, the USA would soon stop sending us ships!

Another thing about those ships. They had stopped bringing us replacement crew long ago. Jack was the last. Now they were taking people home. If they stopped coming, we'd be marooned.

A few more years and we could be self-sufficient. A few more years and we could have colonists, people who never intended to go home. They were aboard now, some of them. Jill and Ty, before Ty was killed. Dot Hoffman was permanent. So was McLeve, of course. Of the seventy-five still



aboard—we'd lost a few to the shuttles—twenty-five or so, including all the married couples, thought of themselves as colonists.

The rest of us wanted to go home.

Canaveral gave us fifty days to wind up our affairs. The shuttles would come up empty but for the pilots, with a kind of sardine-can-with-seats fitted in the hold.

I could understand why McLeve kept working on The Plan. Earth would kill him. And Jill: Ty's death had no meaning if the Shack wasn't finished. Dot? Sure. She was valuable, here.

But would you believe that I worked myself stupid mounting mirrors and solar panel motors? It wasn't just for something to do before the shuttle arrived, either: I had a nightmare living in my mind.

McLeve was counting on about twenty crew: the Big Four, and six of the eight married couples, and

up to half a dozen additional men, all held by their faith in The Plan.

The history books have one thing right. The Plan was Jack Halfey's. Sure, Jill and McLeve and Dot worked on it, but without him it couldn't be brought off. Half of the Plan was no more than a series of contingency operations, half-finished schemes that relied on Halfey's ingenuity to work. McLeve and Halfey were the only people aboard who really knew the Shack—knew all its parts and vulnerabilities, what might go wrong and how to fix it; and McLeve couldn't do much physical work. He wouldn't be outside working when something buckled under the stress.

And there would be stress. A hundredth of a gravity doesn't sound heavy, but much of our solar panel area and all our mirrors were flimsy as tissue paper.

Without Halfey it wouldn't, couldn't work. When Halfey announced that he was going home on that final shuttle, the rest would quit too. They'd beg the downers for one more shuttle, and they'd get it, of course, and they'd hold the Shack until it came.

But McLeve couldn't quit, and Dot wouldn't, and I just couldn't be sure about Jill. If Halfey told her he wasn't really going, would she see reason? The son of a bitch was trading her life for a couple of hours sleep. When Skylark broke from orbit, would she be aboard? She and Dot and the Admiral, all alone in that vast landscaped bubble with a growing horde of chickens, going out to the asteroids to die. The life support system might last a long time with only three humans to support: they might live for years.

So I worked. When they finally died, it wouldn't be because Cornelius Riggs bobbled a weld.

The first shuttle came and picked up all non-essential personnel. They'd land at Moonbase, which was the final staging area for taking everyone home. If the plan went off as McLeve expected, many of them would be staying on the Moon, but they didn't have to decide that yet.

I was classed as essential, though I'd made my intentions clear. The Plan needed me: not so much on the trip out, but when they reached the Belt. They'd have to do a lot of mining and refining, assuming they could find the right rock to mine and refine.

I let them talk me into waiting for the last shuttle. I wouldn't have stayed if I hadn't known Halfey's intentions, and I confess to a squirmy feeling in my guts when I watched that shuttle go off without me.

The next one would be for keeps.

When you have a moral dilemma, get drunk. It's not the world's best rule, but it is an old one: the Persians used the technique in classical times. I tried it.

Presently I found myself at McLeve's home. He was alone. I invited myself in.

"Murdering bastard," I said.

"How?"

"Jill. That crazy plan won't work. Halfey isn't even going. You know it and I know it. He's putting Jill on so she won't cut him off. And without him there's not even a prayer."

"Your second part's true," McLeve said. "But not the first. Halfey is going."

"Why would he?"

McLeve smirked. "He's going."

"What happens if he doesn't?" I demanded.
"What then?"

"I stay," McLeve said. "I'd rather die here than in a ship."

"Alone?"

He nodded. "Without Halfey it is a mad scheme. I wouldn't sacrifice the others for my heart condition. But Halfey isn't leaving, Corky. He's with us all the way. I wish you'd give it a try too. We need you."

"Not me."

How was Halfey convincing them? Not Jill: she wanted to believe in him. But McLeve, and Dot—

Dot had to know. She had to calculate the shuttle flight plan, and for that she had to know the masses, and the total payload mass for that shuttle had to equal all the personnel except McLeve but including the others.

Something didn't make any sense.

I waited until I saw eagle wings and blue wool stockings fly away from the administration area, and went into her computer room. It took a while to bring up the system, but the files directory was self-explanatory. I tried to find the shuttle flight plan, but I couldn't. What I got, through sheer fumbling, was the updated flight plan for the Skylark.

Even with my hangover I could see what she'd done: it was figured for thirty-one people, plus a mass that had to be the shuttle. Skylark would be carrying a captain's gig . . .

The shuttle was coming in five days.

Halfey had to know that shuttle wouldn't be taking anyone back. If he wasn't doing anything about it, there was only one conclusion. He was going to

the Belt.

A mad scheme. It doomed all of us. Jill, myself, Halfey, myself—

But if Halfey didn't go, no one would. We'd all go home in that shuttle. Jill would be saved. So would I.

There was only one conclusion to that. I had to kill Jack Halfey.

How? I couldn't just shoot him. There wasn't anything to shoot him with. I thought of ways. Put a projectile into a reaction pistol. But what then? Space murder would delight the lawyers, and I might even get off; but I'd lose Jill forever, and without Halfey . . .

Gimmick his suit. He went outside regularly. Accidents happen. Ty wasn't the only one whose ashes we'd scattered into the soil of the colony.

Stethoscope and wrench: stethoscope to listen outside the walls of Halfey's bed chamber, a thoroughly frustrating and demeaning experience; but presently I knew they'd both be asleep for an hour or more.

It took ten minutes to disassemble Jack's hose connector and substitute a new one I'd made up. My replacement looked just like the old one, but it wouldn't hold much pressure. Defective part. Metal fatigue. I'd be the one they'd have examine the connector if there was any inquiry at all. And I had no obvious motive for killing Jack; just the opposite, except for Jill and McLeve I was regarded as Jack's only friend.

Once that was done I had only to wait.

The shuttle arrived empty. Halfey went outside,

all right, but in a sealed cherry picker; he wasn't exposed to vacuum for more than a few moments, and apparently I'd made my substitute just strong enough to hold.

They docked the shuttle, but not in the usual place, and they braced it in.

It was time for a mutiny. I wasn't the only one being Shanghaied on this trip. I went looking for Halfey. First, though, I'd need a reaction pistol. And a projectile. A ball-point pen ought to do nicely. Any court in the world would call it self-defense.

"I'm a public benefactor, I am," I muttered to myself.

Jill's quarters were near the store room. When I came out with the pistol, she saw me. "Hi," she said.

"Hi." I started to go on.

"You never talk to me any more."

"Let's say I got your message."

"That was a long time ago. I was upset. So were you. It's different now . . ."

"Different. Sure." I was bitter and I sounded it. "Different. You've got that lying bastard Halfey to console you, that's how it's different." That hurt her, and I was glad of it.

"We need him, Corky. We all need him, and we always did. We wouldn't have got much done without him."

"True enough—"

"And he was driving all of you nuts, wasn't he? Until I—helped him sleep."

"I thought you were in love with him."

She looked sad. "I like him, but no, I'm not in love with him." She was standing in the doorway of her quarters. "This isn't going to work, is it? The Plan. Not enough of you will come. We can't do it, can

we."

"No." Might as well tell her the truth. "It never would have worked, and it won't work now even if all of us aboard come along. Margin's too thin, Jill. I wish it would, but no."

"I suppose you're right. But I'm going to try anyway."

"You'll kill yourself."

She shrugged. "Why not? What's left anyway?" She went back into her room.

I followed. "You've got a lot to live for. Think of the baby fur seals you could save. And there's always me."

"You?"

"I've been in love with you since the first time I saw you."

She shook her head sadly. "Poor Corky. And I treated you just like all the others, back then when—. I wish you'd stay with us."

"I wish you'd come back to Earth with me. Or even Moonbase. We might make a go of Moonbase. Hang on until things change down there. New administration. Maybe they'll want a space program, and Moonbase would be a good start. I'll stay at Moonbase if you'll come."

"Will you?" She looked puzzled, and scared, and I wanted to take and hold her. "Let's talk about it. Want a drink?"

"No, thank you."

"I do." She poured herself something. "Sure you won't join me?"

"All right."

She handed me something cold, full of shaved ice. It tasted like Tang. We began to talk, about life on Earth—or even on Moonbase. She mixed us

more drinks, Tang powder and water from a pitcher and vodka and shaved ice. Presently I felt good. Damned good.

One thing led to another, and I was holding her, kissing her, whispering to her—

She broke free and went over to close and lock her door. As she came back toward me she was unbuttoning the top of her blouse.

And I passed out.

When I woke I didn't know. Now, ninety years later, I still don't. For ninety years it has driven me nuts, and now I'll never know.

All that's certain is that I woke half dressed, alone in her bed, and her clothes were scattered on the deck. I had a thundering hangover and an urgent thirst. I drank from the water pitcher on her table—

It wasn't water. It must have been my own 100 proof vodka. Next to it was a jar of Tang and a bowl that had held shaved ice—and a bottle holding more vodka. She'd been feeding me vodka and Tang and shaved ice.

No wonder I had a hangover worthy of being bronzed as a record.

I went outside. There was something wrong.

The streams weren't running correctly. They stood at an angle. At first I thought it was me. Then they sloshed.

The Shack was under acceleration.

There were a dozen others screaming for blood outside the operations building. One was a stranger—the shuttle pilot. The door was locked, and Halfey was talking through a loudspeaker.

"Too late," he was saying. "We don't have enough

thrust to get back to the L-4 point. We're headed for the Belt, and you might as well get used to the idea. We're going."

There was a cheer. Not everyone hated the idea. Eventually those who did understood: Halfey had drained the shuttle fuel and stored it somewhere. No escape that way.

No other shuttles in lunar orbit. Nothing closer than Canaveral, which was days away even if there were anything ready to launch. Nothing was going to match orbits with us.

We were headed for the Moon, and we'd whip around it and go for the Belt, and that was as inevitable as the tides.

When we understood all that they unlocked the doors.

An hour later the alarms sounded. "Outside. Suit up. Emergency outside!" McLeve's voice announced.

Those already in their suits went for the airlocks. I began half-heartedly putting on mine, in no hurry. I was sure I'd never get my swollen, pulsing head inside the helmet.

Jack Halfey dashed past, suited and ready. He dove for the airlock.

Halfey. The indispensable man. With a defective connector for an air intake.

I fumbled with the fasteners. One of the construction people was nearby and I got his help. He couldn't understand my frantic haste.

"Bastards kidnapped us," he muttered. "Let them do the frigging work. Not me."

I didn't want to argue with him, I just wanted him to hurry.

A strut had given way, and a section of the solar panel was off center. It had to be straightened, and we couldn't turn off the thrust while we did it. True, our total thrust was tiny, a quarter of a percent of a gravity, hardly enough to notice, but we needed it all.

Because otherwise we'd go out toward the Belt but we wouldn't get there, and by the time the Shack—Skylark, now—returned inevitably to Earth orbit there'd be no one alive aboard her.

I noticed all the work, but I didn't help. Someone cursed me, but I went on, looking for Halfey.

I saw him. I dove for him, neglecting safety lines, forgetting everything. I had to get to him before that connector went.

His suit blew open across the middle. As if the fabric had been weakened with, say, acid. Jack screamed and tried to hold himself together.

He had no safety line either. When he let go he came loose from the spiderweb. Skylark pulled away from him, slowly, two and a half centimeters per second per second; slow but inexorable.

I lit where he'd been, turned, and dove for him. I got him and used my reaction pistol to drive us toward the airlock.

I left it on too long. We were headed fast for the airlock entrance, too fast, we'd hit too hard. I tumbled about to get Jack across my back so that I'd be between him and the impact. I'd probably break a leg, but without Halfey I might as well have a broken neck and get it over with.

Leon Briscoe, our chemist, had the same idea. He got under us and braced, reaction pistol flaring behind us. We hit in a *menage à trois*, with me as Lucky Pierre.



Leon cracked an ankle. I ignored him as I threw Halfey into the airlock and slammed it shut, hit the recycle switch. Air hissed in.

Jack had a nosebleed, and his cough sounded bad; but he was breathing. He'd been in vacuum about forty seconds. Fortunately the decompression hadn't been totally explosive. The intake line to his suit had fractured a half second before the fabric blew . . .

The Moon grew in the scopes. Grew and kept growing, until it wasn't a sphere but a circle, and still it grew. There were mountains dead ahead.

"How close?" I demanded.

Dot had her eyes glued to a radar scope. "Not too close. About a kilometer."

"A kilometer!" One thousand meters. "You said two, before."

"So I forgot the shuttle pilot." She continued to stare at the scope, then her fingers bashed at the console keyboard. "Make that 800 meters," she said absently.

I was past saying anything. I watched the Moon grow and grow. Terror banished the last of my hangover; amazing what adrenalin in massive doses can do.

Jill looked worse than I did. And I didn't know. Were we lovers?

"Thirty seconds to periastron," Dot said.

"How close?" McLeve asked.

"Five hundred meters. Make that four-fifty."

"Good," McLeve muttered. "Closer the better."

He was right; the nearer we came to the Moon, the more slingshot velocity we'd pick up, and the faster we'd get to the Belt.

"Periastron," Dot announced. "Closest approach, four twenty-three and a fraction." She looked up in satisfaction. Potato eyes smiled. "We're on our way."

III

On Earth we were heroes. We'd captured the downers' imaginations. Intrepid explorers. Before we were out of range we got a number of offers for book rights, should we happen to survive.

There were even noises about hydrogen shipments to the Moon. Of course there was nothing they could do for us. There weren't any ships designed for a three-year trek.

Certainly Skylark wasn't. But we were trying it.

There were solar flares. We all huddled around McLeve's house, with as much of our livestock as

we could catch stuffed into his bedroom. It took weeks to clean it out properly afterward. We had to re-seed blighted areas and weed out mutated plants after each flare. More of our recycled air was coming from the algae tanks now.

In a time of the quiet sun we swarmed outside and moved all of the mirrors. The sun was too far away now, and the grass was turning brown, until we doubled the sunlight flooding through the windows.

But it seemed we'd reach Ceres. Already our telescopes showed five boulders in orbit around that largest of the asteroids. We'd look at them all, but we wanted the smallest one we could find: the least daunting challenge. If it didn't have ice somewhere in its makeup, the next one would, or the next.

And then we'd all be working like sled dogs, for our lives.

I was circling round the outside of Skylark, not working, just observing: looking for points with some structural strength, places where I could put stress when the real work began. Win or lose, with or without a cargo, we would have to get home a lot faster than we came. The life support system wouldn't hold up forever. Something would give out. Vitamins, water, something in the soil or the algae tanks. Something.

Our idea was to build a mass driver, a miniature of the machine that had been throwing rocks at us from the Moon. If we found copper in that rock ahead—a pinpoint to the naked eye now, near the tiny battered disk of Ceres—we could make the kilometers of copper wire we'd need. If not, iron

would do. We had power from the sun, and dust from the rocks around Ceres, and we'd send that dust down the mass driver at rocket-exhaust speeds. Home in ten months if we found copper.

I went back inside.

The air had an odd smell when I took off my helmet. We were used to it; we never noticed now unless we'd been breathing tanked air. I made a mental note: mention it to Jill. It was getting stronger.

I had only the helmet off when Jean and Kathy Gaynor came to drag me out. I was clumsy in my pressure suit, and they thought that was hilarious. They danced me around and around, pulled me out into the grass, and began undressing me with the help of a dozen others.

It looked like I'd missed half of a great party. What the hell, Ceres was still a week away. They took my pressure suit off and scattered the components, and I didn't fight. I was dizzy and had the giggles. They kept going. Presently I was stark naked and grabbing for Kathy, who took to the air before I realised she had wings. I came down in a stream and surfaced still giggling.

Jack and Jill were on their backs in the grass, watching the fleecy white hens and turning occasionally to avoid chicken splat. I liked seeing Jill so relaxed for once. She waved, and I bounced over and somersaulted onto my back next to them.

A pair of winged people were way up near the axis, flapping among the chickens, scaring them into panic. It was like looking into Heaven, as you find it painted on the ceilings of some of the European churches. I couldn't tell who they were.

"Wealth comes in spirals too," Jill was saying in a

dreamy voice. I don't think she'd noticed I wasn't wearing clothes. "We'll build bigger ships with the metal we bring home. Next trip we'll bring back the whole asteroid. One day the downers will be getting all their metal from us. And their whisker com-potes, and drugs, and magnets, and, and free-fall alloys. Dare I say it? We'll own the world!"

"I said, "Yeah." There were puffball chickens drifting down the sky, as if they'd forgotten how to fly.

"There won't be anything we can't do. Corky, can you see a mass driver wrapped all around the Moon? For launching starships. The ships will go round and round. We'll put the mag—mag, net, ic levitation plates overhead, to hold the ships down after they're going too fast to stay down."

Halfey said, "What about a hotel on Titan? Excursions into Saturn's rings. No downers allowed."

"We'll spend our second honeymoon there," said Jill.

"Yeah," I said, before I caught myself.

Halfey laughed like hell. "No, no, I want to build it!"

I was feeling drunk and I hadn't had a drink. Contact high, they call it. I watched those two at the axis as they came together in a tangle of wings, clung together. Objects floated around them, and presently began to spiral outward, fluttering and tumbling. I recognized a pair of man's pants.

It made me feel as horny as hell. Two hundred million miles away there was a planet with three billion adult women. Out of that number there must be millions who'd take an astronaut hero to their beds. Especially after I published my best-selling memoirs. I'd never be able to have them all,



but it was certainly worth a try. All I had to do was go home.

Hah. And Thomas Wolfe thought *he* couldn't go home again!

A shoe smacked into a nearby roof, and the whole house *bonged*. We laughed hysterically. Something else hit almost beside my head: a hen lay on her back in the wheat, stunned and puzzled. The spiral of clothing was dropping away from what now seemed a single creature with four wings. A skinny blue snake wriggled out of the sky and touched down. I held it up, a tangle of blue wool. "My God!" I cried. "It's Dot!"

Jill rolled over and stared. Jack was kicking his heels in the grass, helpless with laughter. I shook my head; I was still dizzy. "What *have* you all been drinking? Not that Tang mixture again!"

Jill said, "Drinking?"

"Sure, the whole colony's drunk as lords," I said. "Hey. . . black wings . . . is that *McLeve* up there?"

Jill leapt to her feet. "Oh my God," she screamed. "The air!"

Jack bounded up and grabbed her arm. "What's happened?"

She tried to pull away. "Let me go! It's the air system. It's putting out alcohols. Not just ethanol, either. We're all drunk and hypoxic. Let me go!"

"One moment." Jack was fighting it and losing. In a moment he'd collapse in silliness again. "You knew it was going to happen," he said. His voice was full of accusation.

"Yes," Jill shouted. "Now will you let me go?"

"How did you know?"

"I knew before we started," Jill said. "Recycling isn't efficient enough. We need fresh water. Tons of fresh water."

"If there's no ice on that rock ahead—"

"Then we probably won't get to another rock," Jill said. "Now will you let me go work on the system?"

"Get out of here, you bitch," Jack yelled. He pushed her away and fell on his face.

It was scary. But there was also the alcohol. Fear and anger and ethanol and higher ketones and God knows what else fought it out in my brain. Fear lost.

"She's kept it going with Kleenex and bubble gum," I shouted. "And you believed her. When she told you it'd last three years. You believed." I whooped at the joke.

"Oh, shut up," Jack shouted.

"We've had it, right?" I asked. "So tell me something. Why did you do it? I was *sure* you were

putting Jill on. I *know* you intended to go with the shuttle. So why?"

"Chandeliers," Jack said.

"Chandeliers?"

"You were there. Firestone Gems will sell you flawless blue-whites. A chandelier of them for the price of half a year's salary."

"And—"

"What the fuck do you think I did with my stash?" Jack screamed.

Stash. His ill-gotten gains from the Mafia. Stashed as blue-white diamonds.

Funny. Fun-nee. So why wasn't I laughing?

Because the bastard had kidnapped me, that's why. When he found his stash was worthless and he wasn't rich, and he'd probably face a jail term he couldn't bribe his way out of, he'd run as far away as a man could go. And taken me with him.

I crawled over to my doorway. My suit lay there in a sprawl. I fumbled through it to the equipment belt.

"What are you doing?" Halfey yelled.

"You'll see." I found the reaction pistol. I went through my pockets, carefully, until I found a ball-point pen.

"Hey! No!" Jack yelled.

"I'm a public benefactor, I am," I told him. I took aim and fired. He tumbled backwards.

* * *

There are always people who want to revise history. No hero is so great that someone won't take a shot at him. Not even Jack Halfey.

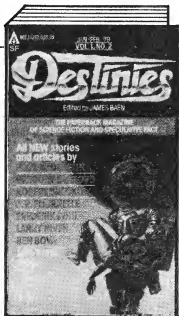
Fortunately I missed. ●

Welcome to the Future Welcome to Destinies

THANK YOU, READERS... for seeing that the first issue of **DESTINIES** went back to press even before it hit the stands—and the second looks like it may do the same! Readers are swept away by the world's very first paperback science fiction magazine—and by stories and articles by writers like these:

- POUL ANDERSON
- GREGORY BENFORD
- BEN BOVA
- ORSON SCOTT CARD
- JOE HALDEMAN
- DEAN ING
- LARRY NIVEN
- FREDERIK POHL
- JERRY POURNELLE
- SPIDER ROBINSON
- ROBERT SHECKLEY
- G. HARRY STINE

EDITED BY
James Baen



ACE SCIENCE FICTION

\$2.25

NEW BEGINNINGS

HOW TO
BECOME A
SPACE
COLONIST

by
JE. POURNELLE
PH.D.

“IF YOU
WANT TO BE
A SPACEMAN,
THERE HAS
TO BE A
SPACE PROGRAM.”



Many and many a year ago, in the dim days before Sputnik, I needed a job. At the time I was a graduate student in psychology. A peculiar one, for I had qualifications as an engineer. My department chairman, not caring greatly for my abilities as a teaching assistant, found me a position in the aerospace industry. There was then beginning a

field known as "human engineering" (which, despite the ominous implications, meant simply "the engineering of equipment to be operated by humans"); naturally that's where I went.

Nowadays human engineering is a recognized discipline and an important one; then it was so insignificant that it was merged with another then-tiny specialty known as "reliability", and the six or so of us in Human Factors and Reliability at Boeing were expected to do it all for a company that employed 60,000 people. Heady work indeed, for we were very nearly the entire operations research staff too.

We were officially assigned work on design modifications to the B-52, but everyone in the Company knew that I was a space nut and that we bootlegged space research on the side; we didn't spend much, and Boeing was a forward-looking company even if the US government had no interest in the Buck Rogers stuff.

Came Sputnik and everything changed: there was money for space, and *lots* of work, particularly in human factors. Those were great days. Somewhere along the line I published a paper called "Factors in the selection of personnel for astronautic missions" (quite dull as I recall; haven't seen a copy in years), and when it came time to select personnel for astronautic missions I was invited to some of the meetings of the group that eventually designed the tests.

Thus you can see that my interest in this month's subject goes way back. So, incidentally, does the genesis of this column: Editor Baen has been after me to do it for years, starting back at another magazine. I'd intended it for last month, but I broke

my hand and couldn't manage it. This time for sure.

* * *

It would seem simple enough. With all our experience we must know what makes a good space crewcritter, and thus it remains only to collect the information from the experts and write it up in my inimitably readable manner.

Alas, no. First, there aren't any experts. There are those who must select astronauts, but they aren't experts because no one knows what makes a good space crewcritter. (With respect to the ladies, may I revert to "crewman" in future? I understand that we need women spacers as well as colonists. Alas, I find "crewperson" inelegant and affected, and my humorously attempted substitute no better.)

It was easy enough to select the first astronauts. We (well, those who did the job; I was a consultant only) knew what we were looking for: hot jet jockeys. Flying the first spacecraft would take skill, and for MERCURY at least the most important—and most difficult—part of the mission was to get back alive. So we wanted test pilots who were highly motivated, able to endure claustrophobia (as John Glenn once remarked, you didn't ride the MERCURY capsule, you wore it), able to endure boredom (not only the endless training for a single short mission, but the endless waiting in the capsule before launch), phlegmatic, adaptable, and above all, mission-oriented.

There were lots of men who fit that description. I say men advisably: Jackie Cochran was about the only qualified woman test pilot in the US at the time. There were thought to be plumbing problems

with women astronauts. The Germans, of whom we had a great many, didn't like the idea of women in space owing to some experiences the Luftwaffe had with women test pilots (I remember Konrad Buettner, former chief of German Aviation Medicine, lecturing at length on the subject). And the idea simply wasn't in the air, back then; probably should have been, but it wasn't. In any event, the problem was to select among a number of qualified male applicants.

The first cut was simple. Select the best pilots, then pick the best engineers from among them. They would all be in excellent physical condition or they wouldn't be test pilots. This reduced the field considerably, but not enough. There was one name that stood higher than the rest: Ivan Kinchloe, test pilot with an engineering Ph.D., rated by his peers as a superb aerobatic pilot. Among betting men in the human factors business he was the definite favorite to be the first man we'd put on the Moon (assuming that he wouldn't have a grey beard by then: we weren't shooting for any ridiculous date like 1969 back then). But Kinchloe was killed flying a routine acceptance flight-test of an F-104, and no other individual stood quite so high. There was a definite need for an objective method of selecting the very best from among an outstanding group. No easy task.

In fact, there wasn't any way on Earth to do it; and we couldn't get off Earth without astronauts.

Therefore a number of irrelevant tests were devised. They weren't *intended* to be irrelevant: remember that no one knew what the job requirement was. One criterion chosen was heat tolerance: we weren't sure what the capsule interior

temperature would be during re-entry. Thus candidates were cooked in labs across the country (including mine). Startle reactions were tested. Physical endurance tests were devised.

One such test, incidentally, was pretty well known by its inventors to be irrelevant: this one involved sticking the candidate's feet in a bucket of ice water and leaving them there for half an hour. It measured nothing relevant to space conditions, but it was thought a good measure of motivation (and probably was; try it sometime).

There were centrifuge tests, shaker-pot tests, and any number of tests of physiological response to stress, usually conducted while the poor SOB was trying to fly a flight simulator.

The result was that group of super-heroes known as The Astronauts, and judging by their performance we must have done something right: the missions were performed just about flawlessly. We lost no astronauts in space and only three in a ground accident. A few had problems once they returned from their missions, and no wonder, given the pressures they were under—and given the way we kept cutting back the program, so that men who'd trained all their lives for a single job found that no one was going to let them do that job again. By and large, though, the selection program worked.

There were the Seven, and then some others, and more after that, and meanwhile we were learning a bit more about space conditions so that the ground tests bore more relationship to the actual mission; but although the original selection tests were modified, the fundamental philosophy didn't change. We wanted highly motivated hot jet jockeys in

splendid physical condition. Came Apollo and someone pointed out that you'd like maybe a real scientist or two on the Moon, so compromise just a little on the test-pilot aspect; the scientists could learn to fly.

Came Skylab, and the criteria changed again. You didn't need three pilots. Two and a flight surgeon or even a genuine scientist (pilot-trained, of course) would do, and while we're at it let's expand the education of the pilots; but still the lot fell to men in splendid physical condition, men so highly motivated that they'd train for a very long time; and other things being equal, test-pilot status certainly didn't hurt. And once again it paid off: remember Kerwin and Conrad going outside to fix the solar panel, and thus save the mission? And it took a great deal of physical strength; Conrad had to heave up on the stuck panel ("I gave a mighty heave, and the science pilot gave a mighty heave, whereupon everything went black and I shot straight up into the air.") with all his strength, and that was barely enough.

The repair of SKYLAB was one of the most dramatic events of the space program. To the general public it was one more proof of NASA's wisdom: obviously they were sending up the right kind of people. Strong, mission-oriented, motivated, splendid physical specimens: in short, astronauts, a word that roughly meant "hero."

By the time of SKYLAB IV (the third manned mission in NASA's confusing nomenclature) NASA wasn't so sure. First, Pogue threw up; not disastrous or even unusual, but NASA regulations required that the crew freeze the barf and bring it back to Earth. Instead they heaved the gup out the

airlock. NASA heard about it (SKYLAB was bugged). The SKYLAB IV crew earned the first ground-to-space reprimand in history. Shortly after that, things got worse. The crew didn't keep up the work schedule. They made errors. They didn't talk to the ground much, and when they did, they bitched. Finally there was a near mutiny as they flatly refused to continue the overcrowded work schedule laid out for them.

Houston's response was predictable: as the astronauts got into difficulties, Hutchinson, the lead flight director, ordered the schedule speeded up; he piled on more work, on the theory that the astronauts were lazy. Eventually Lt. Col. Carr, the SKYLAB IV commander, called a halt, and for a full day the crew did what they damned well wanted to.

Some NASA administrators began to wonder if they'd selected the wrong people.

To make it worse, the astronaut who seemed to be giving the most trouble was a civilian physicist; the science pilot for the mission. Maybe, just maybe, if he'd been a colonel like the other two? If the space program had just kept that gung-ho mission-oriented attitude?

Except that Gibson, the complainer, made more usable suggestions about design of future space habitats than any other astronaut in the history of the program, and Pogue was not far behind; while Carr, a Marine and thoroughly military, was a vehement spokesman against the impossible mission schedule.

And all three worried excessively about staying in shape; in fact, one reason they didn't keep up the science schedule was the time they put in on the

exercise machine.

Clearly some rethinking was needed.

* * *

That's history. We come now to the recent past. NASA had crews for the Shuttle. Who?

The pressure was on. Not so many Greek gods this time. Maybe that's why the public lost interest in space: they couldn't identify with the hero-astronauts, and couldn't conceive of an ordinary person going up there.

After all, the Apollo follow-on programs (my last professional assignment was to work with the mission-planning team for Apollo Extended Lunar Missions) were cancelled due to the low Nielson ratings of the final two Apollo missions. The public didn't find space glamorous enough; therefore, it was seriously said by presumably intelligent people, let's put glamour in space: let's put up some beautiful women. And some blacks, while we're at it.

This wasn't the official view, of course; I don't even know how far this Madison Ave. approach to space extended. I was outside by then; but I was at one meeting where some pretty high-up officials talked like characters out of the movie "Network", and they meant every word of it.

Incidentally, I always thought the whole theory was silly. Leaving out the intellectual wisdom of using sheer popularity as the principal factor for making a decision as important as any in human history—and the space program in my judgment is as important as the invention of agriculture, or fire, or the lung—the TV ratings weren't the proper way

to measure public interest. Analogy: people watch the World Series; but even an avid baseball fan may turn to the news instead of an in-season game. Does this mean we should abolish baseball?

And the program's lack of glamour was as much NASA's fault as anyone's; as Ted Sturgeon once remarked, NASA's most astounding achievement was to make mankind's greatest achievement look *dull*. Most of the PR types NASA hired were old flacks; it wasn't until very late in the game that they cooperated with interested dramatists; and they were *always* willing to shunt science fiction writers off into a corner to make room for the "legitimate" press (such as the *East Pasadena Shopping News*, which got press passes to VIKING while the foremost science fiction writer of our time was refused admission. No, I am not making this up. I was there, having taken the trouble to get a press card. And yes, some quite high officials of NASA were informed, and couldn't understand why the decision was shortsighted.)

But for a number of reasons, the Greek god approach was to be abandoned: some plain folks would be selected. The word went out.

And lo, the applications came thick and fast. Meters-tall stacks of them flowed in. Of these thousands, there were hundreds of applicants qualified under any rational rule you could think of.

Now what?

Well, number one, don't change the rules for the pilots. Select from among the best jet jockeys, and insist on physical perfection. No one's going to argue with that, and it makes sense anyway: Shuttle isn't the easiest bird to fly, having the gliding

characteristics of a flat rock.

But now we've got to select science types, and we're stuck. We've dropped the Class I FAA pilot's physical. We've dropped the training flights in T-birds. We've dropped the feet-in-cold-water test (which, relevant or not, was one of the most efficacious in eliminating applicants). We've dropped the centrifuge tests. So how are we to choose among hundreds of qualified people? What rational means can be employed?

Well, I don't know. Maybe it would help to introduce you to someone who didn't make it.

Meet Dr. Danielle Goldwater. Graduate of Yale University and Yale Medical School. Residency and training at Stanford. Of the woman applicants, one of the very few who could do any chinups. Not obviously inferior in any of the other tests given. Certainly not unintelligent. Able to get around in a full-pressure suit; found it tiring, but so did most of the others, men and women. Not claustrophobic when stuffed into the personal rescue sphere (a sort of enormous plastic beachball with internal life support which will be used to carry personnel without pressure suits through vacuum). Certainly motivated—in fact still works in space research. Willing to go. Why wasn't she selected?

No one I know is certain: but she wears glasses. She doesn't have 20/20 vision; and those selected all seem to be able to see without glasses. The official criterion now is 20/20 without glasses for pilots, and 20/100 correctable for the scientific personnel.

As near as I can tell, those selected in the latest round of tests are Greek gods and goddesses; nearly perfect physical specimens. Given equality

in academic and scientific credentials, the ones who don't wear glasses and who are in the best physical condition get the nod.

Sensible, right?

Wrong.

* * *

Once again we're faced with irrelevant criteria. If left to me (which it surely won't be) I'd rather see the old feet in the cold water, which is also irrelevant but does measure pain tolerance and endurance and motivation, and thus has (in my judgment) more power to predict success in space than does the presence or absence of glasses.

Look: the major objection to spectacles in space is that when you're buttoned into a full pressure suit, you can't adjust or wipe sweat off your eyeglasses; and that might be important. Only: present NASA policy is that the non-pilot crew on Shuttle won't even *have* full pressure suits. If the shop loses pressure, they're to use the beach balls.

And general physical excellence isn't relevant either. Sure, if Kerwin and especially Conrad hadn't been in terrific shape, they'd never have been able to endure the early days in SKYLAB and certainly wouldn't have been able to go outside and fix the crippled bird; but so what? The science types on Shuttle couldn't EVA if they had to: no suits. And EVA is the only really physically demanding job.

Maybe health considerations? I think not. The evidence is against it, anyway. Dr. Harold Sandler, who heads a group at NASA Ames studying space physiology has concluded from his test (and from the SKYLAB data) that "from what we've seen, there

are no physiological limits to prevent anyone from going to space. Some may need protection, such as g-suits, but the protection systems are readily available. The only real limit is common sense."

Present data indicates that age isn't particularly important either.

And finally there's this remark from Dr. Heany at the Skylab Life Science Symposium: "I have found myself asking, repeatedly, why there is this quite extraordinary emphasis on physical fitness for function in a weightless environment. Great muscular strength and endurance, which have obvious survival value in the jungle, are all but redundant in a zero-gravity environment . . . We can select individuals already adapted to something closer to zero gravity . . . I refer to sedentary, skinny, small individuals, like myself, who would be better suited than these athletes."

It's true enough that for *long* missions in zero-gravity, the healthiest jocks who exercised the most came back in the best shape, but that's long missions; a year after their return there was no physiological evidence that any of the astronauts had ever been in space.

But having said all that: I don't know what criteria NASA ought to be using. There are too many applicants and they have to be weeded out somehow. Since we don't know the relevant criteria, NASA will *have* to use irrelevant. I wish them luck.

* * *

So: if you're looking for a spot on the Shuttle to be paid for by NASA, you've not a lot of chance, and I can't help you much. My best advice is to study an

experimental science, get top grades, and in general act as if you're trying to win an appointment to the faculty of Harvard University. In addition, you'll want to be a perfect physical specimen with 20/20 vision (at worst 20/100 correctable to 20/20). It won't harm you to be able to do 100 pushups, swim five miles, run ten, and do 30 chinups.

Not much help, eh? Sorry about that. Wish I had better news. And I do.

However, my good news requires some optimistic assumptions about the future of man in space (and thus, in my view, optimism about the future of mankind). I must assume that space flight will become routine; that there will be a lot more than quickie scientific Shuttle missions in future.

Let's assume, for instance, that we opt for Solar Power Satellites. How can you get on the construction gang?

Well, alas, the physical condition parameter is very important here. The early construction crews will have to endure low to null gravity for periods as long as humans can stand them without permanent physiological damage; and will have to do a lot of EVA work, which we know to be as tiring as any human activity including professional sports or lumberjacking (in the old days before chainsaws, yet).

The skills are fairly obvious. There will be room for power-system engineers, construction workers, riggers, electronics experts, power workers, cooks, physicians, and the whole panoply of talents required to do heavy construction in an isolated environment. Study what kind of people INCO took to the Guatemala jungles to build their power plant, and you'll have a good idea of the skills needed for

power stations in space.

* * *

But beyond the initial construction there is another phase: the exploitation of space. We can assume that some kind of station large enough to provide artificial (spin) gravity has been constructed, and various companies are looking for workers who'll go up and make them lots of money—and incidentally get rich themselves, since for a good long while salaries of space-based workers are going to be a pretty small part of the cost of doing business in space. Who will they pick?

Here we get into a myriad of unknowns: not in the sense that we can't predict the personnel policies of GM and Westinghouse and IBM and Upjohn, because we can, and if you're really interested in spaceflight you'll go read up on what they teach personnel managers in business administration courses. No: the unknowns are in space itself.

ITEM: what are the long-term effects of low gravity on humans? SKYLAB gave no real answers, just more questions. True, the crew of SKYLAB IV, who stayed up longest, seemed to make healthy physiological adjustments that the SKYLAB III crew weren't up long enough to experience—but IV's crew also had the greatest losses of bone calcium. Would that too have ceased had they stayed up longer? No one knows, although the Russians may find out. (Whether they'll tell us, and whether they'll tell us the truth, is another problem; as I write this they don't know either.)

ITEM: assuming that we'll have to keep the earliest

space structures at lower pressures, and thus have to use some gas other than nitrogen to mix with oxygen, is there an interaction between low-gee, low pressure, and different gas mixtures? There certainly is an interaction between gas mixes and tolerance to *high* pressures; SEALAB and other experiments proved that.

ITEM: is diet a factor? It quite likely is, you know. But in which direction?

ITEM: science fiction has long assumed that low gravity makes for longevity. Arthur Clarke assumed it in his Lunar colony stories; so did Heinlein; so have we all. Yet there is not one shred of evidence for this. In fact, the only *evidence* we have points in the opposite direction. I happened the other day to be talking about this with Robert Prehoda (YOUR NEXT FIFTY YEARS; shortly to be published by ACE Books; recommended) and he told me of an experiment done years ago in which rats were subjected to high gravity (they lived in a centrifuge). Those kept at 3 gravities developed legs like, uh, superrats; the experimenters said "they walked like little elephants"; and the 3-gee rats lived longer than the normal-gravity controls!

Of course there are a myriad of objections to this experiment. Rats aren't people. Would varying the diet have an effect? And so forth. But it is the only experimental evidence I know of, and it points in exactly the wrong direction.

ITEM: how long is the tour of duty? This is related to the above questions, naturally. But it should be obvious that the longer the term, the cheaper the project (getting people up and down is the most expensive operation in space, requiring flights by man-rated boosters, etc.); and therefore the mis-

sions will be made as long as possible.

If the missions are relatively short, you'll get a lot of volunteers. The longer the tour in space, the better your chance, because the fewer you'll compete with. And if it turns out that the only way to build Solar Power Satelites is to build permanent colonies in space? That going to space for a year or more is a permanent decision: that you can't go home again (as Heinlein assumed in *The Moon Is A Harsh Mistress*)—then what? The number of volunteers is going to plummet. In my interview with Dr. Danielle Goldwater I asked if she'd go on a space construction project. Certainly. And if you can't return? No.

She thinks older people might.

I know damned well I can get plenty of volunteers for the one-way mission; but it's unlikely they'll have to compete with recent Yale MD's.

* * *

Now what advice have I for the young person now in college or high school who wants someday to go to space and spend considerable time there? (If you want merely to go for a short mission, write NASA at Houston and ask what they advise; and do that annually, because their criteria are going to change; and be prepared to compete with people like Dr. Goldwater.)

Well, the qualifications break down into three categories.

Physical: This is obvious. As time goes on the physical fitness requirements will get less and less attention, perhaps, but given equality in professional qualifications, the best physical specimen

will be chosen. Stay in shape.

Education and Professional: Not so obvious. You have to make two predictions: skills needed in space, and the number of people who will have that skill *at the time you want to go*. The second is harder than the first: the US, for its sins, allows high-school seniors to allocate a very great part of its educational investment. (Departments get money by enrollment; thus they operate a kind of oriental rug market trying to attract majors; and those choosing the major have vast influence over the department budgets.) Thus there's no rational plan for training skilled personnel; what we're short of this year we may have in overabundance four years later.

What you ideally want to do is choose a skill useful in space that few will have when you're ready to go.

Some pointers: if it can be done on the ground, it will be. Recall that the more effort we put into space, the better space-ground communications will be. Thus you want to study observational astronomy rather than theoretical if you're determined to become a space-based astronomer. You want to study computer hardware rather than programming. Programming can be accomplished down here, so why send up an expensive man? If you're in biology, you want to be an experimentalist, and get lots of practice in the lab.

In fact, whatever your field, get your hands dirty. Learn how to use, repair, and make the equipment needed for your specialty. Become a gadgeteer. If you go into architecture and design, take a summer off and do construction work. Learn a building trade. In fact, I'd say a good industrial designer with architectural training who can show a year or two

of high-steel construction work might be uniquely and evidently valuable.

Pay a lot of attention to articles on space industry, and choose a specialty accordingly. Materials science. Manufacturing/engineering. Biological production work. But whatever you choose, get into the messy end of it; learn to *do*, not just think. And it should be obvious that the more skills you have, the better your chance.

Psychological: Here's the tricky one. Recall the situation: you're asking to go up and work in cramped quarters with others. You'll be under stressful conditions, and you won't see many new faces—while you'll get damned tired of the old ones.

Can you handle that? Are you adaptable enough? And if you're not Mr. Nice Guy (or Ms. Nice—O Lord, what term do I use? Fill in your own. I'm in enough trouble already) can you nonetheless manage not to drive insane others who'll have to put up with you? Do you have nauseating habits?

Offhand, I'd say learning old-fashioned *manners* would be worth the effort. I've found by and large that mutual politeness can make tolerable a multitude of stressful situations. (I don't always practice that, as some of you know; but then I'm a bit old to be planning a long-term career in space. Perhaps, just perhaps, I'll get a shot aboard a mission set aside for journalists and bards; and if so, for the duration of that mission a politer person you'll never see.)

Given that you can manage to stay sane and not drive others up the wall, how do you prove it? That, I fear, I'm not going to tell you. I suspect I can figure out a number of the psychological tests they're

likely to use in the selection process, but I suspect I'll be doing you no favors — and I know I'll be doing your potential shipmates no favors — by telling you which. It's not easy to study up for that kind of test, but it's possible.

And given the costs of sending you to orbit, any big company is likely to do some checking: talk to your roommates, neighbors, old boy/girl friends, current girl/boy friends, employers, peers, and in general anybody who's had to get along with you. I would.

* * *

So. We've covered NASA missions past and present, construction projects, and early space industries. What about colonies, either Lunar or O'Neill?

Physical: Requirements relaxed, or course. There'll be fewer applicants. Older people may well be preferred for psychological reasons (as well as skills). All things considered, the healthier you are, and the better condition you're in, the better your chances of going; but it won't be quite so critical.

Education and Professional: Again relaxed. More skills will be needed. Agronomists with actual farm experience will be highly desirable. Some entertainers may be wanted, probably as a secondary ability rather than full-time, but there may well be recreational specialists who can direct drama, teach dance, and organize entertainment in general. The more nearly self-sufficient a permanent colony can become, the cheaper it will be to operate; thus there will be a myriad of skills needed. You need only convince the management that it's cheaper to take you up than to import whatever it is

you do.

Teachers and child care will be important (but may be left to families of professionals, or traded off). The general emphasis will still be on *doers* rather than thinkers, but again not so stringent: given the 1½-second time lag between the Moon or the O'Neill colony and Earth, communications won't be quite so good; it may be better to have an on-board programmer than to talk by TV to an Earthbound computer hacker. But do note that if it can be done on Earth, it probably will be.

I should also mention a fourth qualification here: *financial*. It is by no means unlikely that colonists will have to buy stock in the corporation. The governance of a space colony is beyond the scope of this column—indeed might make a good column someday—but is in any event likely to be neither straight corporate nor straight democracy; and I can easily see the requirement that colonists invest, say, the equivalent of \$100,000 in 1978 dollars as a condition of going. (Those with particularly needed skills may be excused the investment, of course.)

Psychological: I haven't a clue beyond common sense. We just don't know enough. It's possible that whoever is organizing a space colony will insist that most colonists come as families; it's also possible but unlikely that they'll try to abolish the family altogether and make the colony one big commune. That latter is in my judgment unlikely to the point of near-impossibility: I've seen the horrible outcome of many and many an attempt at a perfect commune; but it could be.

The colonies will be larger than scientific satellites or industrial satellites or construction shacks; more screwballs can be tolerated, for the stress per

individual will be less. But the organizers are very likely to have theories on both organization and mix of personality types wanted, and frankly I haven't any better qualifications for guessing those than you do.

Maybe that's not quite true. Were it my problem, I'd do as I advised you in an earlier paragraph: look carefully at the personnel practices of some of the largest US (and West German) corporations. Look especially at how they select middle management, and what is their attitude toward the employee's personal life. (Some big companies couldn't care less what you do when you aren't at work; others want to manage your entire life, and will let you know exactly what they think of, say, living together without benefit of clergy.) You might also take a look at the personnel manuals for the US Civil Service (although God Forbid that we get a Civil Service Colony!) {{I can't resist: in the old days at Boeing we used to call BOMARC the Civil Service Missile: it won't work and you can't fire it.}}

* * *

Which about covers it. If you're seriously interested in how to become a spaceman you'll have joined the L-5 Society (1620 N. Park, Tucson, AZ 85719, \$20 annually, students \$15) and get their newsletters and other information; you'll attend meetings of the American Association for the Advancement of Science, and of the American Astronautical Society; and in general you'll keep up with the literature of your future chosen profession. (For that matter, I recommend the L-5 Society to all my readers.)

I've left one thing off. It is perhaps the most important of all:

IF YOU WANT TO BE A SPACEMAN,
THERE HAS TO BE A SPACE PROGRAM.

Elementary, no? And there's a good chance the space program will be proxmired. Make no mistake, friends: the politicians are out for our blood. I live in California, and I was an ardent supporter of Proposition 13; my property taxes had quintupled in seven years. And many of you know I am no ardent supporter of high taxation of any kind, or of big government.

Leave that: my point is that suddenly it's fashionable to be for tax cuts. You would think from hearing from him now that the Governor of California had invented Proposition 13 (when in fact he condemned it roundly up to the day on which it won by a landslide).

What better way for the Fritz Mondales of this world, who have always hated the space program, to win popularity than by killing NASA in the name of lower taxes?

Without NASA we have no space program. It is the historic mission of government to build roads to the frontier and provide access for settlers. Until that is done, there won't be any settlers.

So: if you really want to go to space, tell your Congressman, early and often, that when it comes time to cut government spending, don't cut out the space program; that the last time you felt really proud of the US of A was one July afternoon when through the hiss and crackel came these spine-chilling words: *The Eagle has landed.*

Do that much, or there's no point to this article. ●

THE PILOT

by
Joe Haldeman





To fall ever Outward:
a fate worse than death?
Oh, ecstasy of flight!

The set is out of adjustment: a green streak slashes diagonally through the viewing cube, impales the smiling host.

She tries to adjust it by softly licking a molar, remembers, curses economically, turns a knob until the streak disappears, another knob to sharpen the image. Host smiling goodbye to someone. Feel of cold metal sticks to her thumb and finger until she rubs it away on her thigh, disgusted, nose wrinkling. How many filthy traveling salesmen and conventioners and hotel maids have touched these knobs since they were last sterilized? Have they ever been sterilized?

"Our next guest is a woman with a marvelously rare occupation." *Occupation!* He smiles offcube and the picture scale diminishes to include her as well, not smiling, trying not to fidget on the filthy leather chair. "She is a spaceship pilot . . ." *I am a spaceship.* ". . . but no ordinary rocket jock. She pilots a slowboat between the Earth and the outer

solar system—the asteroids, even as far as Saturn. Her name is Lydia Meinenger and she's a fellow New Yorker." *New Yorker*. "Lydia, would you tell us something about slowboats; how they—"

"In the first place," she interrupts, "they aren't slow. They go much faster than anything you use in the Earth-Moon system. The name is a hangover from the old robot tugs that crawled along on Hohmann transfer orbits, to minimize fuel use. A Hohmann tug took six years to get to Saturn; I can make it in thirteen months. Nine months, with a Jupiter flyby. But I can't do that with passengers."

"Because of the radiation?"

"That's right." *Warm like summer sunshine*. "They can't wrap everyone up in lead, the way I am."

"That's probably the most fascinating aspect of your job, Lydia. The way you're wired up to the ship, you're actually part of it." *I am the ship, you actual fool*.

"'Wired up' is a little extreme. They don't use surgical implants any more, but just induction plates pasted over various organs. There are a few small wires associated with the somatic feedback system," *O slow ecstasy*, "but they enter through natural body openings and you hardly feel them once they're in place."

"This feedback thing, this is how you control the ship?"

"That's right. There's an initial calibration that, well, as long as I feel good," *Good!* "then every system in the ship is working properly. If any system varies from its expected performance, I feel it as an illness or slight pain. The nature and intensity of the wrongness tells me which system is involved

and gives me an idea as to the severity of the malfunction. For instance, a hydrogen ullage problem, where the fuel flow is momentarily uneven, I feel as a hot spasm of—"Screen goes white, low chime, —tum."

Host smirking behind filthy hand. "Afraid the censor won't let *that* slip by, Lydia." *They live in shit so can't talk about it?* Chuckles. "It doesn't seem very precise."

"The important thing is sensitivity, not precision. Instantly knowing which system is hurting. Then I can call up the appropriate system parameters and compare them to the ideal mission profile. I can usually fix the trouble with the help of the ship's diagnostic library. If not, I call Company Control on the Moon."

"So your main job is troubleshooting."

"Yes." *Like you troubleshoot your body? Filthy fool couldn't find your liver with both hands.* "I make decisions regarding the maintenance of the ship."

"It doesn't sound very exciting . . ."

"It is."

Looking at her expectantly; she doesn't continue. "You must have quite a technical background." *For a woman, say it fool.*

"No. I majored in classical Latin and Greek. The technical part is easy. Any reasonably intelligent woman could do it."

"I, uh, see . . . you—"

"There are no male slowboat pilots. I don't suppose your censor wants me to discuss that. You'll just have to go ask a twelve-year-old." She flashes him a bright metal smile. "Much nicer than—" Chime.

Weak try at an urbane chuckle. "There's an in-



teresting side benefit to your job. I'll bet viewers would be surprised to know how old you are."

"She lets him wait just long enough; as he opens his mouth to save himself: "Sixty-five."

"Now, isn't that marvelous? You could pass for twenty."

"As could anybody who didn't have to contend with gravity and sun and wind and this — " Chime. "—that passes for your food and drink and air. I've spent most of my life immersed in oxygenated fluorocarbon, weightless, fed a perfect diet, exercised by machines."

"But your job is dangerous."

"Not very. Perhaps one in thirty is lost."

"More dangerous than holovision." His image turns a little fuzzy; she touches the filthy knob to sharpen him. "The atomic drive itself must be hazardous." Carries her contaminated hand into

the bathroom, listening. "Not to mention meteors and—" *Fool.*

"No, actual catastrophes are very rare." She washes the offended fingers carefully. "The dangerous time is turnaround, when the ship is going with maximum velocity. It's supposed to flip and slow down for the last half of the journey." Leaves the soap on warm clean fingers. "Sometimes they don't flip, though; just keep going, faster and faster. Too fast for the Company's rescue ship."

"How terrible." Standing in front of the set, dry hand tugs elastic, urgent. *Clothes!* "They just keep going . . ."

"Forever." *Ecstasy, O!* "The pilot may live for centuries."

"Well . . . if ever a cliché was true . . . that does sound like a fate worse than death." *Fool.*

She nods soberly. "Indeed it does." *Fool, fool, O damn, doesn't last this way.* She sinks back onto the bed and starts to cry. *Fry them dead.*

He puts a filthy finger to his lips. "Well. Are you, um, going to be on Earth long?"

"Only another two days." Hurting herself, she stops, wipes eyes, soap sting brings new tears. "I like being back in New York, but the gravity is tiring. The air makes me cough. I look forward to going out again." *Last time, fry the bastards.*

"Saturn this time?"

"No, for a change I'm going to the inner system. Taking 500 colonists to the new Venus settlement." *Taking them to burn.*

"Is that more dangerous? I mean, I don't know much about space, but isn't there a danger that you could fall into the Sun?"

She smiles politely. "No, none." Sharp metal

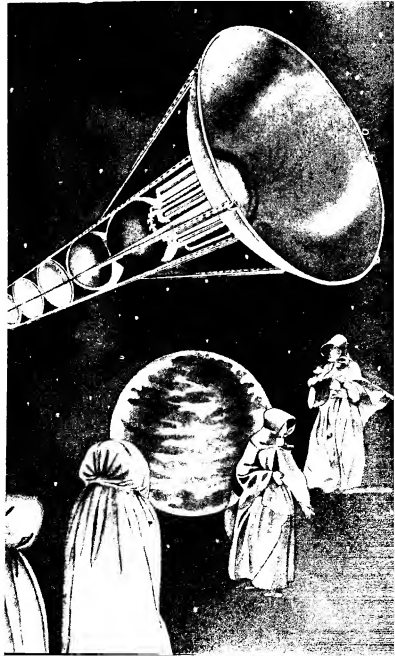


teeth, she runs her tongue along behind her teeth but the switches aren't connected. "It would take as much energy to 'fall' into the Sun as it takes to escape from the Solar System." *Less to skim it, though, fry.* "All that gravity. I suppose it might be possible; I've never made the calculation." *Characteristic velocity 17.038 emos, exit inclination 0.117 rad, goodbye solar system, goodbye filth.*

Blank stare. "Yes . . . oh, Jimmy's giving me the signal." *Right at perihelion, goose it all the way up, emergency override, nineteen gees, crush their dry baked bodies into dust.* "I'm afraid we've run out of time."

Cargo shit baked to sterile dust. "We certainly have enjoyed having you here, Lydia." He holds out his hand and she looks at it.

Bound for the stars, forever young, the dear ship inside of my ecstasy. "Thank you." ●



**Look hard: the world
is just what it seems to be;
if you kick that rock you're
liable to break your foot, right?
Look harder: maybe you'll
break something else...**



The Story Writer

by Richard Wilson

A man at a flea market sat at a typewriter reading. His table was the barest of all. On it were a ream of paper, a pencil and a sign: "This Typewriter for Hire. A Story Written about You: \$1 a Page." The typewriter was an old Remington office model on a stand next to the table.

Other tables were crowded with curios, knickknacks, carnival and depression glass, insulators, china, woodenware, campaign buttons, barbed wire and other collectibles and bygones. Few dealers brought valuable antiques to an outdoor flea market; there was always the threat of pilferage or breakage or rain.

The story writer was a man of 55 with a tidy mustache. He was William Wylie Ross, one of the last of the old-time pulp writers. He was smoking a pipe and reading a book of short stories by Slawomir Mrozek called *The Elephant*.

A boy of 10, who had stood watching Ross, went up to him and said: "Dzién dobry."

"I beg your pardon?" Ross said.

"I said good morning in Polish. You are reading a book by a Pole and I am of Polish descent. I thought you might be too."

"No. I read Mrozek only in translation. Good morning. What is your name?"

"Nazywam sie Henry. Jak sie pan nazywa? I said in Polish: 'My name is Henry. What is your name?' My father, who was born in Poland, says it is good to preserve the traditions. I am bilingual."

"Your father is wise," Ross said. "My name—Nazywam sie Ross. Did I say it right?"

"Very well. Is Ross your first or your last name?"

Ross gave the boy a card. It said: *William Wylie Ross, freelance writer; short paragraphs at the going rate, full-fledged autobiographies by arrangement.*

The boy read the card. "It says nothing of a story about me."

"That could be a biography; they run 300 pages up. In your case maybe 20 pages, depending on how intensely you've lived. A shorter work, as the sign says, is a dollar a page. Would you like one?"

"Can you write a ghost story?" Henry asked.

"Would you like a sample? No charge."

"Yes, please."

Ross put down his book and rolled a sheet of paper into the typewriter. He wrote. "Henry sat alone in his room. He was the last person on Earth. There was a knock at the door."

He took the sheet out and gave it to Henry. "That's the world's shortest ghost story."

"It doesn't have a title. And it doesn't say who wrote it."

"A critic, are you?" Ross put it back in the machine. He typed **WORLD'S SHORTEST GHOST STORY** and, below that, by *W. W. Ross*. He said to the boy: "I don't use my full name on such a short piece. Besides, it's not original except for the name of the protagonist."

"What's a protagonist?"

"You are. The main character. The boy in the room. The one who knocked at the door may be the antagonist."

"Oh. Can you write a true story about me?"

"I can."

Henry took a dollar from his pocket and put it on the table. Ross wrote a story about a ghost writer and a boy named Henry who asked him to write a ghost story. He worked quickly on the story, which was similar to what you have just read, except that he left out the Polish because he couldn't spell it. Double-spaced, it ran to two pages plus a para-

graph on the third.

Henry looked embarrassed. "I have only a dollar."

Ross handed him the pages. "No extra charge. It's really a collaboration."

A man had come to watch. He said to Ross: "I am Henry's father."

"How do you do."

"I am well, thank you. I am glad Henry spent his dollar here instead of in a foolish way. You read Mrozek. Do you admire Polish writers? Korzeniowski? Later he called himself Conrad."

"I admire good writers whatever their nationality. I admire Conrad."

"Dziekuje bardzo. Thank you very much. And thank you for what you have written for Henry, moj syn. My son. I think he could be a writer one day. Dowidzenia. Good-by."

"Dowidzenia," Ross said. "Dziekuje bardzo, Henry."

Several tables away a young dealer had set up at the back of his camper. His sign read *Mad Wayne Anthony, Stony Point, N.Y., ANTIQUES 1870 UP*. Ross supposed it meant some of his wares qualified as antiques by being at least a hundred years old and that Wayne had combined an allusion to their price; his least expensive was marked \$18.70. There was a small hand-lettered card on his table which said *We haggle*.

Wayne Anthony had old 78-rpm records. He played one now and again on a Victrola. He had a ritual of wiping it with a treated cloth, holding it by its edges as he settled it over the spindle, winding the machine and carefully placing the needle. The

music, not amplified except by the big old horn, was clear but unobtrusive. Ross could ignore it if he chose or he could give it his attention and savor the old melodies. At the moment, Wayne, who explained to his fellow dealers that the records were not for sale and that he was planning to go to Heuvelton where there was a barn full of real oldies, was playing *It's Like Old Times*.

Ross saw his next customer. Sometimes he could tell who it would be. She was a plump young woman who had stood within earshot until Henry and his father left. She walked sideways to Ross's table as if she were going somewhere else. Ross became engrossed in relighting his pipe until the girl was at his elbow. He picked up his book, said casually "Hello, young lady," found his place and pretended to read.

The girl said: "Excuse me. Could you write a story about me?"

He exhaled smoke and put the book down. "If I knew something about you I could try."

"There's not much to tell."

"There might be. Let's start with names. Mine's Ross. What's yours?"

"It's funny you should ask that because I've changed it."

"Did you? That's a beginning. Tell me about it."

Ross and the girl talked. People who had watched while he wrote Henry's story went away. She talked more freely. She said things to him, a stranger, that it was possible she'd never told another.

"Yes," he said. "I can write your story. If you don't care for it you needn't pay. But you haven't told me your name or why you changed it."

"My name is Mabel." She talked some more.

Ross wrote this story:

Once a young woman named Mabel who thought she was plain changed her name to May-Belle because she wanted something about her to be beautiful. She was not really plain. She had good features and a ripe, honest figure. But she was afraid her boy friend found her unattractive. She thought he preferred Jane, who painted her face and had a fashion-model figure. The boy, Ralph, went off to war and came back blind.

Jane went to see him once, out of duty, at his parents' house. She never went again.

May-Belle invited Ralph to a picnic and they had a fine day. After that they were together often. Inevitably they talked about Jane. Ralph said: "You know, I used to like Jane but I don't any more."

"I can't understand why," May-Belle said. "She's prettier than ever."

"Is she?" Ralph asked. "It must be skin-deep pretty because I can't see it. I can see you, though, and I see you beautiful, Mabel." The blind boy called her by her old name and she liked it.

Ralph learned Braille and got a job at a radio station and after awhile he was a popular disk jockey. And when he and the girl of his choice went to the town clerk to get a marriage license she spelled her name Mabel because he liked it that way.

A simple story for a simple girl? No, a straightforward story for a straightforward girl. Ross had felt good writing it and she'd been pleased with her dollar's worth.

Ross didn't wish the boy blindness, except to

Jane's skin-deep beauty. He wished heartily for the happiness of May-Belle, by any name. He had an idea her last name would be Ralph's.

William Wylie Ross had not been as prolific as Max Brand or Lester Dent but he had done well enough in the pulp magazines after a stint in reporting. He had come to the pulp field later than the veterans but had earned his two or three cents a word when that was good money. He used a distinctive three-name byline as many had before him—Carroll John Daly, William MacLeod Raine, Joel Tinsley Rogers, Edgar Rice Burroughs.

After the paperbacks killed the pulps he wrote for them and later for television. He adapted one of his western tales as a pilot for a television series. It sold to a network, caught on with the public and was renewed year after year. Ross had a good agent and got one of the best of the early contracts. He owned a piece of the property and wrote the scripts for many seasons. Later he became story editor and executive producer. Others wrote them, hewing to his guidelines. Royalties, residuals and foreign rights made him rich and he retired before he was 50. The series still ran in prime time and re-runs were syndicated around the world.

Ross had married once but he and his wife had no children. They learned that it was he who was sterile. They joked about it sometimes, referring to him as the barren one, and once he signed them into a hotel as Baron and Lady Ross. Another time he registered as W. W. Ross, Bart., and Lady and during their stay some of the staff called them Mr. and Mrs. Bart.

They were content for a while but she always

resented the hours his writing demanded and his refusal to adopt a child. On the day she turned 30 she divorced him and married a widower with three children by whom she subsequently had three of her own. He remained friends with her and got to like her husband, a professor of American literature, who came to like him. The six kids knew him as Uncle Bart.

After he retired he collected. At first he sought copies of his old pulp stories in second-hand stores. He had written more than he remembered—detective, adventure, air-war, science fiction, westerns. Before long he decided he was indulging in narcissistic nonsense. He began to collect American first editions, specializing in former pulp writers who had made it big—Dashiell Hammett, Raymond Chandler, Cornell Woolrich.

He retired because his old friend Marv had told him to slow down. Doctor Marv had told him straight, not in his office but in his home after dinner in the presence of Doctor Tina—Marv's wife who'd just earned her Ph. D. with a concentration in gerontology. It was stress, high blood pressure, hypertension, whatever the current terms were, brought on by who knows what but helped along by overweight and alcohol. Smoking two packs a day wasn't helping any, either.

Marv had told him: "Quit the stress and do what you'd really like to do because if you don't—Just do it, Will. For me, if not for yourself. I want you around a bit longer." Tina told him please to keep on aging so she could study him properly now that she had her degree.

So he moved out of New York, to which he had returned after his long television stint in Hol-

lywood, and went upstate, where he had been raised. He bought a house in Auburn, the small city which had been the home of Samuel Hopkins Adams, the writer, and before that, William Henry Seward, who had bought Alaska.

It was a fine old house. He filled it with period furniture, Adams' first editions and Seward memorabilia. He bought a few canvases by Auburn painters Barney, Rising and Sunter.

He liked a morning walk and a late breakfast at the Auburn Inn. He wore suntan pants and shirt and an old-fashioned vest which held pen, pencils, a slim notebook and paraphernalia for his pipe. He ate scrambled eggs, whole wheat toast, marmalade and coffee. Liz, the waitress, who was as old as he was, called him Will. He always tipped her a dollar.

From the inn he walked to the old brick and frame gallery on William Street to see whether Bob Muggleton had found anything of interest.

In his absence from the house Minnie Barnes let herself in once a week and cleaned. Then she visited a friend who was serving a term for armed robbery in the Auburn prison. Minnie carried a Bible in a brown paperbag and often invited Ross to attend a service at her church. He went once and sat in the back row. He was the only white person there and although he enjoyed the sermon and the singing he felt like an intruder and didn't go again. He had put a hundred-dollar bill in the collection plate and made a note to send an annual contribution.

From church he went to an auction in a barn near Skaneateles and sat in the second row while bids went by him on cast iron banks, barbed wire, a mammy bench, post-hole diggers and a cranberry

scoop. His only bid was on a Little Big Book based on his western hero. It cost six-fifty to take it home.

Home was where the heart should have been. He put his acquisition on a shelf next to old stuff he'd written. A re-run of his series was on television but he didn't watch it. He had a drink and smoked a pipe and went to bed.

His collecting led him to the flea market. Jud Ransom, a dealer friend, had invited him. "You never know what you'll find," he told Ross. "Too much of it is junk but I'm often surprised."

Jud had a shop in town. It specialized in mechanical banks, old typewriters, penny movie machines and other things that people collected now. The shop had a good trade; other dealers made their way to it from many states.

They went to the flea market in Jud's Econoline van, shunpiking at an easy speed and enjoying the scenery along the older roads.

"I'm satisfied if I clear expenses," Jud said. "I bring two or three fine pieces. It's good advertising; people notice them and take my cards. Weeks later they telephone or drop in at the shop. The rest is stuff I sell cheap."

At the First Original Famous Flea Market, in the lee of a farmhouse on Route 3 north of Port Ontario, Ross helped Jud unload the big table, two camp chairs, the penny machine that showed an early Charlie Chaplin short, an Oliver typewriter, a bank that shot a coin into a tree trunk, a cherry pitter, a broken spinning wheel and other bygones. The biggest was the old Gypsy Fortune Teller. They eased her from the van to a level place near the table. "Never could have brought her without you,"



Jud said. "Takes two to handle her."

It was a big rectangular box whose glass top enclosed a gray-haired wax figure of a woman in faded Romany garb. Her hand hovered over playing cards fanned out in an arc. A sign said: "Gypsy Granny Tells Your Fortune—5¢."

Ross put a nickel in the slot. Hidden machinery came to reluctant life. The head turned from side to side. The hand moved back and forth above the cards, then stopped. A pasteboard fortune fell into a tray. Ross read it: "You will do a good deed and happiness will result."

"Granny always has an upbeat message," Jud said. "She attracts trade and earns me a few nickels."

They finished setting up and relaxed in the camp chairs. Jud poured coffee from a Thermos. "Don't expect a roaring trade. I enjoy the fresh air and the people."

There were few customers that early. Dealers dropped by and chatted. One said he had a gadget that might interest Jud, who went to see it. Ross finished his coffee and lit his pipe. A few cars came off the road and parked in the field down the hill. A man stopped to look at the typewriter. "Does it work?"

"Probably," Ross said. He took a page from his vest-pocket notebook and rolled it into the Oliver. He tapped out: "My name is Oliver. Oliver Twist. What the Dickens—I really write! More?"

The man nodded. "When I was a boy I had H-O Oats for breakfast. There was a picture of Oliver Twist on the box, asking for more. How much is it?"

"The tag says thirty dollars."

"I see that. What do you have to get for it?"

"I'm just minding the store. Come back when Jud Ransom's here. Maybe you can work out something better."

"I may do that." The man went to look at a set of Jerry Todd books at another table.

A young couple came by. The girl took up the cherry picker. "I saw one of these in Joel Salter's paper," she said. "See? The prongs go down and push out the pits and the prongs come up with the cherries and they fall into this thing down here."

"I suppose that means you can't live without it?" the young man said.

"Not if you want cherry pie like your grandmother made."

"We'll take it," he said. "Seven-fifty?"

"That's it, plus tax." They worked it out and Ross took the money, feeling as good as if he had sold a story.

Jud returned with an elongated wooden object that scissored open. It had grooves in unlikely places. "Nobody knows what it is but I never saw anything like it."

"Couldn't live without it?"

"You're picking up the jargon."

"A few people were here," Ross said. "I sold your cherry picker and got a feeler on the typewriter."

"Good man. The price on the Oliver is firm. It cost me twenty."

A plump blue-haired woman in sun glasses put a nickel in the Gypsy machine. It whirled as before and the wax head and hand moved. But then it clanked to a stop. No fortune dropped.

Jud said: "Sorry, ma'am. I'll refund your nickel."

"I'd rather have the fortune."

"I suppose I could open it up and get you one."

No. I didn't bring the key."

Ross said: "That's all right, madam; there is a backup arrangement. In case of malfunction Granny's message is transmitted to the keys of this venerable typewriter."

"Really?" the woman said.

"Yes. You see, the patent dates of the Gypsy and the typewriter are the same. They also happen to be the year of my birth. Thus an affinity is established."

"You're putting me on. But I love charlatans. For a nickel—"

"Make yourself comfortable in Mr. Ransom's chair and I'll see what Oliver has to say. You realize I haven't the Gypsy's years of experience in this work."

"Charming. Just make up something. It doesn't have to be Romany. A cookie fortune would do."

Ross took the other chair. He poised his fingers over the keys of the old typewriter. "You realize there are professionals in that line of work? They're the people who write greeting card verses."

"Well, pretend you're a professional and write me an upbeat fortune."

Ross bit his pipestem. He said: "First your name."

"Effie Ostrander. Miss."

"Excellent. The initials E and O start us off—Each of us has hidden talents; yours will help another."

"Lovely. Go on."

"As the sun shines on you today so it will for infinite tomorrows. May all kinds of ethnic fortune smile on you. Romany. Chinese or USAmerican, your happy future is assured."

Miss Ostrander said: "It's a fine message. Please elaborate."

"For five cents Oliver can go no further, " Ross said. "Like most of us he has his price."

"Thirty dollars," Jud said in the background.

"That's for Oliver, not his words," Ross said.

"I must admit I've had more than my nickel's worth," Miss Ostrander said. "What would he charge to go on?"

"It's a question that hasn't come up before. A dollar?"

"Fair enough."

They spoke a little longer and this told Ross some things about her. He filled three pages, recapitulating events of the morning from her point of view. Part of it was about him. The last paragraph read:

"Miss Ostrander spent a dollar and five cents. She had the satisfaction of passing the time pleasantly in the open air and the bonus of having been the catalyst that fed Ross's springs of invention, making him something of the story writer he had been."

She took the typed pages and went away reading them again, her blue hair reflecting the morning sunlight.

On the drive home Ross said: "I forgot. I owe you Miss Ostrander's dollar."

"Keep it. You earned it."

Back home with his recollections of the day Ross thought he might go again with Jud but with proper paper and his own typewriter. Another Sunday he could set up his own table. It was a vagrant thought but it intrigued him. People would be there, each with a story. He could draw them out and write about them. For the first time in many nights he went to sleep thinking ahead instead of back.

It was early August at the First Original Famous Flea Market and Ross had had his own table for many Sundays. Jud, having seen him settled in, was off on a buying trip to Vermont. The weather had been wonderfully good. Not once had the dealers been forced indoors to the crowded old barn; it rained in midweek, as if the gods smiled on their Sundays.

Ross had packed a lunch. A chunk of Swiss cheese, a small box of raisins, a spiced beef stick, a raw carrot and hot coffee in a Thermos. And after the eating the reaming of the dottle from the pipe and the refilling and the luxuriant lighting-up and the first fine mouthful of satisfying smoke.

Savoring his pipe, Ross listened to Mad Wayne Anthony's Victrola playing *Mad Dogs and Englishmen*, an orchestral arrangement of the Noel Coward song. Ross thought: No dog shall bark—Mad Anthony Wayne's infamous but necessary order as he prepared to storm the British-held height at Stony Point.

Associating, Ross thought for the first time in months of his friend Dirk Easterly and Dirk's dog Drool, a Labrador retriever who never hurt you when he gentled your hand in his jaws but whose saliva wet you in a loving way. In the presence of slobbering, loving Drool he and Dirk had signed a youthful pact at the base of a tree in the urban-bound woods of Alley Pond Park, Queens. Dirk said in 17-year-old solemnity: "One day one of us will need the other and we vow here in our blood—get down, Drool!—that nothing will interfere with that. There may be no one else to help—wife, dog, lawyer, friend—but each will know the other will come if needed, if the blood oath is invoked. This

we swear, knowing all it may mean, whether we're a continent or worlds apart. You call, I come. I call, you come. This we swear, on pain not only of death, which is bearable, but of disillusionment, which would be too much."

Dirk read a lot and his language showed it. They had not invoked the pledge but in infrequent meetings over the years they recalled it, laughed about it and then, in an adult but not denigrating way, reaffirmed it. Laughing on the surface, as if to indulge their younger selves, but meaning it underneath they reswore, sealing the other with a toast to the departed Drool, their friend and bond.

People walked past Ross's table. He had a good place, between the lady with the treen, which is what they call woodenware in the trade, and the family with new and old books and prints. Ross had bought his Mrozek paperback from them for ten cents.

Trade being slow, he refilled his pipe and read Mrozek's story about spring in Poland, which was a season other than any he'd known. Ah, to be in Poland in such a spring! It was good to be here, too, close to the burgeoning fields, within earshot of a lowing cow and a squawking crow and a brook gurgling as heartily as if still fed by snowmelt.

Nevertheless he was marking time. There was more to be said than he had ever written. Long ago he knew he'd not write the great novel or the immortal story. Somewhere, because he was professionally good with words, he knew there was a challenge to meet that would give him satisfaction. But there weren't as many futures now as when he'd been twenty, when the horizons were infinite. Since then he had spent a lot of time learning his

trade until he could write almost anything passably well. But he recognized his limitations. Not for him the Nobel or the Pulitzer. His limited talent had earned him a good living but it would not bring immortality.

He was in this frame of mind, reflective, semi-sad but satisfied with what he had, enjoying nature's sounds and his pipe and taking comfort from the presence of his typewriter, filled with untapped tales, when the cloaked stranger stopped at his table.

Ross had known weirdos and freaks, as they called themselves. He could sympathize with their dramatic ways, having been one of them himself, long ago.

(If only then he had known his potential; the freedom to do anything that could be done! But he hadn't known. He'd been limited by his needs—to make a living, bring in the extra dollar, take the higher-paying job.)

The stranger regarded him with knowing eyes. "I know you and you will know me and we needn't go on about that now."

"Possibly so," Ross said.

"It's as so as I stand here. Explanations later. William Wylie Ross, will you, for the purposes of the story you will write, accept me on faith?"

"I have no faith," Ross said. "I've lived too long."

"Hardly long enough," the stranger said. "You are on the threshold. Believe this. You have been investigated and chosen, if you will agree."

"I think I know who you are. I don't know if I will agree."

"Tell me who I am. I'll be what you say."

Ross considered him, letting his mind wander.

Another customer to while away the day. "Your name is Street. First name?"

"None. Or anything you wish."

"John? There's a John Street in New York, downtown."

"If you say so."

"You're one of the street people—once called beats or beatniks, then hippies, freaks, weirdos. You're a mystery man, a local character, odd but harmless."

"I sound dull."

"You roam by night, scanning the sky and talking to it."

"That's better. Does the sky talk to me?"

"Recently it did. You encoded the message on the back of a picture postcard of the First Baptist Church of somewhere. Whilomville? You signed it 'St.'"

"What message?"

"Decoded, it meant 'Contact established.' But what you wrote was 'Nothing new but hello anyway. St.'"

"'Hello' was the key word?"

"Probably. A postal clerk read your card and mentioned it to a friend, who told a reporter. The reporter didn't write a story but word spread that a man with long hair and a long cloak was calling himself a saint."

"Street abbreviated 'St.," said Street.

"And because the postcard showed the First Baptist Church there was talk that you considered yourself St. John the Baptist. There's John again."

"You do tie things together. Do I look like a saint?"

"You might pass. You're nothing like Simon

Templar, of course."

"The name means nothing to me."

"I suppose not. They keep a sharper eye on you now, in case you're dangerous. A religious fanatic. A potential threat."

"Am I?"

"You may be a threat to our way of life. Because you're alien."

"My papers show I was born in Canastota, New York."

"Sure they do. And possibly your papers say you're seventh or eighth in a long line of Streets. Do you know Eighth Street? In the Village?"

"The village of Canastota?"

"Greenwich Village. Nobody'd give you a second glance there, among the street people of Eighth Street."

"It sounds more friendly than John Street. Why do you call me alien?"

"You're lonely. You wonder if you have been abandoned by your kind but your loyalty prevents your making friends here."

"Yet I've sought you out."

"Tell me why."

"You tell me. Write a story about it."

Ross considered it. He'd already begun, in his mind, as they talked. But it would take many pages—many more than the simple stories he'd written for Henry and May-Belle and Effie Ostrander. The stranger called Street was probably no more than he seemed—a Kesey-Kerouac type who had seen his youth go by, who had rejected the establishment but had been rejected himself by the new youth. An outcast, a weirdo now not weird enough. All at once Ross felt close to the man who

stood there, tall, composed but lonely in his assumed grandeur, defiantly costumed.

"I'll write your story," Ross said.

"Thank you. It may be your story as well."

"Possibly. I rarely know how a story will end."

This is what the story writer wrote:

"A man at a flea market sat at a typewriter reading. His table . . ."

He wrote that and the other words you've read so far. Though he typed steadily it took him a long time. Street was patient.

People came by. Some paused and, seeing Ross engrossed, passed by.

Ross stopped typing. "I've taken it up to now," he told Street.

"Take it further."

"It's tiring work. I've written many dollars worth but I've seen no money."

"I offer more than money. That's not your need."

"What do you offer?"

"Write," Street said. "Put it down now. Whatever you say is possible. What can you lose? An hour of your time?"

"Shall I write a fantasy?"

"Anything. Put it down and see how it comes out."

Ross stretched in his chair and relit his pipe. He drew in a great mouthful of smoke. As it trickled out he thought what he might write, half-listening to the cows and the brook and the old Victrola ("Bye, Bye, Blackbird.")

"You hesitate," Street said.

"I'm a skeptic. Who can believe you?"

"Aren't you also a romantic?"

"Yes, I am. But what's better is that you've given me a deadline. I find that I want to do it and I will."

"I'll load your other pipe."

"Thank you. I'll want it." Ross rolled a clean page into the typewriter. He asked: "Anything?"

The stranger sat on the ground and stuffed the pipe with tobacco and tamped it well. "Anything," he said.

Ross began to write.

This is what he wrote:

Think of the possibilities. Ignore the likelihood that this fantastically-garbed stranger called Street is other than he hints he is. Take him at his word. As he says, what's to be lost?

Let us assume he's what he implies he is, how I imagine him to be, and let's get words on paper, in the old way, one after another, revisions later.

Let's take a 55-year-old hack writer with nothing in his future except more money than he needs and let's just imagine. What else is there to do this Sunday afternoon?

This isn't really the time or place for so large a work. Another time: late evening, when the mystery would be greater than it is here in the sunshine. Another place: home in privacy where I could bang it out in first draft with refinements and corrections to come.

But I make excuses. I'm a professional. I can do what I must.

Must I do this? No, but I want to. I can't explain. It may become clearer as I write.

Let me describe Street, my cloaked stranger, my catalyst. Not a physical description but what, for the purpose of the story, he must be. Let me pre-

tend I am writing fiction, which is my skill or talent.

Street is a visitor here, or hereabouts, from a far-off place I'll name later. He has a specific purpose. Street needs me, or someone like me, or he'd not have sought me out.

He is a foreign service officer in his alien government; an important person not quite in the top hierarchy. I see him as the alien equivalent of a deputy assistant Secretary of State in the United States Department of State. A career man, skilled, dedicated, with limited authority in his area of expertise but with some powers of decision delegated to him.

We need a name for his government—short for easy pronunciation and typing, with an X in it for the unknown. Lux? Good in Latin, but here it's just soap. Lex, for law? As a freelance who once ghosted a Burroughs novel I think Lex Barker, whilom screen Tarzan. Sax as in Rohmer? Bix as in Beiderbecke? Max as in Brand? Lox as with bagels? You see my problem. The name mustn't be associative or comic.

Street (obviously not his real name) is silent as I write and I flank the X with vowels—Axa, Exe, Ixi, Oxo, Uxu. One sounds like a weapon, two is a river, Ixi sounds icky, four is a bullion cube. Five will do. Uxu. Pronounced *ucks-oo*.

The Uxu had problems. (Past tense now. Shift your point of view, please.) They'd lived long on scattered planets to which they'd fled when their own world gave signs that it would be destroyed at the impact of a free-flying planet with an affinity for their world's magnetic core. Their calculations told them none could survive such a collision. So off they went in many small spacecraft to the many

little worlds they'd tested and found congenial. There could be no mass migration to any other world; none within their reach was big enough for all of them.

So they migrated in different directions but kept in touch over the years.

And while they were apart they built a great ship in sections, a bit here, a bit there, which eventually was assembled in space, tested and deemed suitable for star travel. It was big enough for all, and capable of the extended journey there had been no time to prepare for when the iron planet precipitated their exodus.

Now a reunion was in order. No more diaspora. Time to put it all together again. The fatherland, the homeland, the promised land awaits, they told each other. It's reunion time, alumni, and alma mater calls. Sing the anthem, wave the flag, appeal to the ethnos. Let's regroup, gang. Everybody back in the house.

They all fitted in nicely, having reduced themselves in size, just as the separate parts of the star ship had merged into a working whole.

Now they were ready to roam the galaxies, going from sun to sun, comfortably self-contained as they sought a new world suitable for them all.

They had been on their way for many years when a great helioc eruption affected their sun-powered engines. Their ship was tossed as by a tempest and they were thrown irrevocably off course.

Thus by chance they made landfall on this island in a far system, this Earth.

They had expected that they would be somewhat different when they reached their destination but they did not expect a change of such

magnitude—that they would suffer a space change, though “suffer” could be less than the accurate word. Their suffering was mingled with hope; they realized that the sun storm could have destroyed them and it was possible that the change they had experienced had benefited them. After all, as Ariel told Ferdinand some hundreds of years earlier, the change was into something rich and strange.

Some changes result from suffering. But suffer has another meaning; it means let. So after the great storm they let it happen to them, whatever it was, as their journey continued on a new course. The space change they had suffered, or let happen because they had no choice, was indeed a beneficial one. It prepared them for the alien conditions they had to adapt to when they got here and came to know us as creatures not too dissimilar from themselves. Street’s people had been modified to the way they needed to be to survive among us, in my world.

I tend to forget, as I write, that the truth is what I say it is in these growing pages of manuscript. I have no special interest except to write a story for him, to keep the keys clacking as honestly as possible.

The length bothers me a bit. At a dollar a page I wonder if he’ll be able to afford my discursive typescript.

Street looks over my shoulder. He says nothing.

The Victrola plays *Where Is the Life That Late I Led?* A loneliness creeps in. For them? For me?

The world they found was Earth, and they began to make their home on it, in an interstitial way. But Earth was giving them a hard time because Earth

was scared of them.

Who on Earth? . . .

Not the ordinary man or woman in the United States, China, Russia, Lapland or Uruguay, because the ordinary people hadn't heard about them. The frightened ones were at the highest echelons—the presidents and prime ministers, the semi-autonomous investigative agencies, the military, the foreign ministries.

All had contingency plans for alien contact but the plans were out of date. They had been drawn up first in the dark ages of modern diplomacy, when a Frenchman named Verne wrote persuasive extraplanetary stories about the moon. Suppose some day somebody actually went to the moon and found a threat there? So plans to deal with that contingency were drawn up. Later an Englishman named Wells excited people with a story about Martians invading Earth. But Wells' vision was fiction; real invaders would not necessarily succumb to the common cold. The contingency plans were updated. (They really have people doing this. You'd be surprised at their titles and salaries.)

Then a transplanted European named Gernsback upset them anew with a stream of publications from Hudson Street in which authors from around the world wrote convincingly of menaces from all the universe and beyond.

Then, in a relatively new medium, came Orson Welles, a theatrical type who borrowed from the English Wells and scared a nation one Halloween. Then came specialized periodicals whose writers told of interplanetary intrigue that threatened the wellbeing of Earth.

These visionaries made fictional but putative

menaces cheap and available to the masses.

Not only was it necessary for the rulers of Earth to be aware of the extraterrestrial threat—it was necessary for them to make the masses see that they were doing something about it.

And so, just as in years past there had been appointed an atomic chief, a transportation czar, an energy boss, an inflation fighter, the great minds of Earth established a bureau to consolidate all the other bureaus that had been dealing theoretically with the possibility of extraterrestrial contact. And in their wisdom they endowed it with extralegal powers and gave it the code name Stab.

Some thought Stab was an abbreviation for Establishment but nobody knew for sure, and nobody knew who headed it. Nobody but a relative handful of higher-ups who saw to it that a public information office was set up to issue press releases that assured everybody else that everything was Under Control, that the Alien Menace, if menace there was, would be Dealt With.

In a once-popular parlor game the victim was told the others would make up a story he could reconstruct by asking questions. His questions would be answered Yes, No or Maybe. He was told the answers would give him clues.

He didn't know there was no story, that the answers were based on a formula. If the last word of his question ended in a consonant the answer was No. If it ended in a vowel the answer was Yes. If it ended in a Y the answer was Maybe. Thus the questioner made up a story of his own that sometimes looked into his subconscious.

I think I'm doing that with Street. I question him and he replies. But as in the parlor game I wonder

how much of what I write is from my subconscious or my imagination.

It is decreed in their philosophy (religion?) that in a new land they will find a philosopher—a prophet?—and that although he will make great demands on them he will guarantee them security. He will protect them from potential enemies. Though his price is high it is fair because it will enable them to settle and regroup and rebuild and multiply.

They call it their future book. Maybe I'm not the philosopher-prophet their book foretold but I'm the best they have. They apparently searched far before they found me and I have to believe their faith is justified.

I'd like to quote from their future book—their *Tome of Time*, as it translates. But of course I haven't seen it. I know only what Street has told me about it; more accurately, what I've pieced together from his answers to my questions. You must bear this caveat in mind: all he has said has been filtered through my ears and into my typing fingers; my understanding may be imperfect but I must believe that what I write is true.

Street nods approval. On the Victrola George Brunis is singing *I'm Gonna Sit Right Down and Write Myself a Letter*.

I must believe what their philosophy holds: that only what is written endures. My moving fingers type, leaving a record that will not be erased. Because it exists it is so. It is so because it exists. It is true because I have said it and believed it. It stands as an addendum to the *Tome of Time*, the future book becomes present, then past and immutable.

Street nods: I have said it. It is written, as foretold,

and joins other prophecies that control their lives and now guide mine.

I've suspended my disbelief to the extent that I see logic in this. It's an attractive concept for a man who's created a kind of reality from gossamer things—the idle thought, the 2 a.m. inspiration, the hope that vagrant words, inked on paper from ribbon or pen, will persuade their readers, at least during the reading, that such things can be.

It's not easy to say where the Uxu are. They're not physically among us on the Earth we know. It's a dimensional phenomenon. I can put it best in nonscientific words, the only ones I command.

Try this: Railroaders dispatch trains in opposite directions over single-track lines. The runs are precisely scheduled and no train meets another at a wrong place. The dispatchers use sidings, bypasses, lay-bys; the terms differ around the world but the result is the same—minimum space accommodates maximum traffic.

In a more sophisticated way communications engineers find room in their undersea cables and telephone, radio and satellite circuits for more than one message at a time. What was once a single, or at best dual, circuit now carries many messages simultaneously.

There are lots of unused spaces. Dr. Dolittle used them when he wrote upside down between lines and in margins.

Factory workers used these spaces in World War II when housing was short and people on different shifts slept in the same beds at different times.

So with us and the Uxu. It's clear now that they coinhabit the Earth in a separate dimension, on a

plane that they, but not we, have discovered. They coexist with us, sharing land, sea and sky, in the interstices of our being. Their heartbeats complement ours. We breathe in while they breathe out. They ecologize our waste spaces, utilize our not-yet-depleted plenty: two trains on a single track; hundreds of messages on a single beam; twice as many words on a page; twice as many people in a bed.

They're not quite here and only a few of us have had an inkling that there are aliens in our midst, interstitially. They're literally among us but invisible, as we are to them—except when they deliberately cross the dimensional border. Yet they're uneasily sensed, uncomfortably poised just beyond the threshold of perception. They're like figures in Escher's symmetry drawings—flocks of geese, schools of fish flying, swimming in opposite directions, one group light and one dark, each apparently unaware of the other and each taking up exactly as much space as the other leaves unfilled.

"Rest for a time," Street said (or I wrote that he said it, needing a few minutes away from the typewriter). "Stretch your legs."

"Good idea." I got up and headed for the old farm privy that had been reactivated for exhibitors and customers. At the cook shed I bought a root beer. Sipping it, I went round the tables, saying hello and looking at wares.

Mrs. Shearer said: "I saved something for you." It was a fine old Autofiller made by the Schaaf Foundation Pen Co. of Toledo, patented June 30, 1903. "It doesn't fill any more," she said, "but it writes a lot with one dip and a writer should have it."

"It's a beauty," I said. "How much do you have to get for it?"

"Fifty cents?"

"That's not enough, surely."

"It was in a box from an attic in Weedsport. I couldn't ask more."

Pleased to have it, I paid with a Franklin half dollar. I knew Mrs. Shearer collected them.

Nearby was Hester Goodbout's display of tramp art—old cigar box wood intricately whittled and carved and glued to form picture frames, jewel boxes, letter holders. A vanished and little-known craft only lately appreciated. I bought two pieces from Miss Goodbout, to give her some trade, and we talked about the art of homeless men who hadn't begged but had exchanged their special talent for meals or shelter.



Back at my table I looked for Street. He was not in sight.

I finished the root beer and looked at the sheet of paper in the Remington. Refreshed, I wanted to get back to work. I was annoyed at Street's absence. The devil with him; maybe I could go on without him. Was he not a saint but a devil? Was I Faust and he come to tempt me? Undeniably I am a latter-day Faust; before me there was a pulp writer named Frederick Faust, better known as Max Brand, creator of Dr. Kildare and millions of words of westerns.

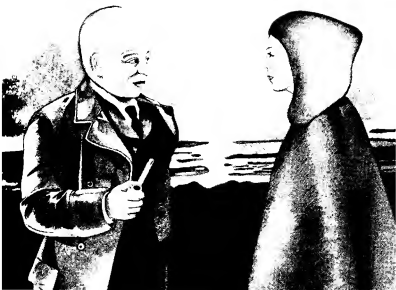
The neighborly Victrola played the Furtwangler version of a scene from Gounod's Faust.

As a former story editor I knew there were one or two things in the plotline that needed fixing. I set the bottle on the table and my fingers stroked the guide keys: a s d f, j k l ; . . . I . . .

I looked beyond the flea market to the drumlin that hid part of Lake Ontario, shimmering bright on each side. The slope of the hill seemed to move. A slow brown avalanche against the green growth. But not a dirt slide. No; a procession of people. A mass of cowed figures. A multitude in monk's cloth, moving down, coming this way. Thirty, fifty, sixty of them; I couldn't count. Far enough away to be indistinguishable one from another; near enough to fear. They were coming here.

On level ground now, they came determinedly across the flat of the land between. The outer exhibitors saw them and called to others. Eyes turned, then stopped. Then everything stopped except the brown mass of cowed monks.

The other exhibitors had been immobilized in the middle of a gesture, a sale.



Only I had special dispensation, to type away, to put it all down.

The strangers came among us, faces hidden deep inside their cowls, and went from table to table, touching the goods quickly, moving on. One came to my table, bringing a chill breeze as a cloud crossed the sun. The figure stood at my side as if to know what I wrote. I strained to see past the shadow of the cowl but could find no face, only a darkness punctuated by what might have been stars, or eyes. The being touched the page in my typewriter and exchanged words in a strange musical tongue with another of its kind. All the others moved away. The visitor remained, the star-eyes as inscrutable as before, the presence as awesome.

The others moved back up the drumlin. As they topped its rise and vanished the flea market came to life. People moved, fingered goods, haggled,

bought, moved to other tables. The Victrola played *When the Saints Go Marching In* and I gathered courage to look directly into the star eyes of the cowed figure who had remained at my side.

I saw the features of a woman. I stood in greeting and regarded her frankly. She wore leather sandals and her small feet were perfect. I looked from toe to head and said, "Good afternoon."

"Good afternoon," she replied. "I came as you would have wished, had you known me sooner."

"I know you now," I said, and dared to add: "You are Uxura. You must be."

"Because you've written it so?"

"Do we need a because?" I realized that she was not young, observing the sun wrinkles at her eyes and the smile lines at her mouth. I appreciated them, having creases of my own.

"Welcome to our Earth," I said.

"Thank you, if Earth this be. I'll meet you closer later, perhaps, through the barrier."

"I see no impediment between us."

"If you see that, so it must be. You are the prophet, the seer and scribe, the molder of our destiny."

"I write. I know little of prophecy."

"You know my name and I know yours, Mr. William Wylie Ross."

"You are Uxura but why do I know that? And you have most delightfully come, Uxura, but why?"

"You reply. Write it and we both will know."

"It may be known later, when the story is finished."

"It is in your hands. Let them make me a useful person. Let your fingers give me depth and purpose, to contribute to the peace and security of our

peoples."

I hardly knew what I wrote, what consciousness guided my words. "My fingers write that you have already given much. Your husband, a great man, piloted an early Uxu ship. He died when it crashed in a test. You are Street's mother. Yet you are so young."

"I am proud to be all of these, except young. My son tells me you are the scribe the gods foretold, that you were always in our destiny."

"Waiting in the wings with a workable scenario? I can't really accept this god business."

"Then better for us all. Rather a doubting but well-intentioned godservant than an arrogant unfeeling one who delights in power for its own sake." She smiled. "I beg your pardon, but it is you who puts the words in my mouth—which longs to know yours . . ." She stopped in surprise.

"Really—" I said, as surprised as she at the reality of her saying the words that had been in my thoughts.

The presence of this woman who appealed to me so vitally and who said the words I'd dared not say aloud made me want to race ahead with the narrative, to reach the obligatory setback, to overcome it logically and get on to an ending, preferably happy.

There's not space here to describe Uxura. I'd have to ask many a man what kind of woman he admires. Twain's Joan? A childhood sweetheart? Doyle's Holmes' Irene Adler? Lena Horne? Margaret Sullivan? Amelia Earhart? The grandmother you ran to when your mother punished you?

Put them all together and they spell mother, wife, lover, companion, love object, sweetheart, the eternal woman. My feelings, still chaotic, about Uxura.

So soon? So late?

If the women I've named are too old for you—I'm an old party myself—how about Jenny Agutter, Becky Thatcher, Tatum O'Neal, Peter Pan's Wendy Darling?

That much I wrote and, though much must have been strange to her, she responded in an age-old feminine way. She drew my head to her breast and put her lips to my forehead.

It was more than an embrace. In that brief contact we exchanged two lifetimes of experience. I felt her life flow into mine and fill me with understanding of all she had known. I knew that at the same time she was absorbing everything that had made me whatever I was or believed myself to be.

In that moment we came to know each other in a more intimate way than I'd known any other, even—I thought of my marriage—even after living with someone for nearly a decade.

I learned from that touch between Uxura and me that the difference in our ages was far greater than the distance which had once separated us. She was not the young middle-aged woman of 50-odd years my eyes saw her to be, but three times that. Her son Street was not 30 but 90. I, a mere 55, with three years to live or a hope for twice that if I took care of myself, as Doctor Marv and I knew I probably wouldn't, could expect a lifespan of many more years on Uxu if I allowed myself to be transported there—to live not to an unfulfilled 58 or 61 but possibly to a robust 64 or 73.

This she told me in knowledge greater than words and this I believed.

Much more passed between us then; more than I can tell here; more than I could care to tell if I had

all the space and time to tell it.

As we drew apart I felt we had woven a bond impossible to sever. Her warm glance said the same was true for her.

But then I wondered how many others she had shared herself with in such a way and I was saddened. She was quick to sense my thought. She touched me lightly, fingers to cheek, and I knew I was the first beyond her family to know her thus, and I was comforted. Even in that brief aftertouch, as I questioned why, she told me I was different, I was special.

I believed and was satisfied.

Thus my decision to go where she dwelt—I hoped not only for the pleasure of her company but to give her the pleasure of mine for more than a moment of time. Sweet Uxura. Selfishly I chose to go not for the wish to save our two worlds as I had begun to believe I might, not for the adventure of it and the new experiences I might translate into fiction; no—only so I could cling longer to life and in the respite cling to Uxura.

It was time to write an exit line for her, knowing I'd write her in again, and return her son Street to the stage. Mad Wayne Anthony's Victrola played *Somewhere I'll Find You*.

I delayed Street's entrance and said to Uxura: "You know we'll meet again? And that when we do there will be more time for us and for many other things?"

"Yes," she said, "but you write in question marks. There are things you must accomplish. Some do not concern me but others do, most vitally. You will say it in the writings. It is a charming quark."

Why had she used that word? I searched my

memory and recalled that a physicist had invested some nuclear particles with certain wondrous qualities. He called these particles quarks, borrowing the word from Joyce.

Later other physicists spoke of refined particles they called charmed quarks that one day might help make clear to man the basic nature of matter. Then they combined a charmed quark with its negative number and produced what they called a charmonium.

Whatever the scientists postulated, their speculations ended in question marks, as most good theories should pending another Einstein.

But long before that a humbler breed of men had made quarks part of their everyday, if specialized, language. They were the telegraph operators.

When I was a cub reporter in awe of their easy professionalism they used "quark" routinely in their messages. It was an abbreviation that shortened their Morse transmissions, just as they shortened White House to WHU, Supreme Court of the United States to SCOTUS and, later, Nelson Rockefeller's recurring phrase "brotherhood of man under the Fatherhood of God" to BOMFOG. To these hamfisted realists, quark was simply the abbreviation for question mark. Play that on your charmonium.

I thought of Murray Gell-Man, James Bjorken, Theodore Kalageropoulos and other physicists who pondered the ultimate. Uxura's amber eyes recalled me to the present.

"These things are beyond me," she said. "You among others control my destiny. I am glad we have met, Will."

Her token of farewell was a touch of her hand to

my cheek. I gave her a warm symbol of my own, a kiss on that hand.

"When will you come again?" I asked.

"I'll be near when there is need," she replied.

I made that her exit line. There are needs and needs.

She was gone. Would I see her again? A charming quark whose answer I knew.

Uxura was gone and in her place was Street, somber, disturbed.

"I met your mother," I told him. "She—"

"No time for that. Is it true that your people plan to obliterate us?"

Street was casting a pall over what had been, all in all, a pretty nice day. Why was I letting him? I much preferred his mother.

He went on: "Can it be that such a plan, which we know exists, would be implemented? Are there those in your government so callous—"

Street spoke of a pre-emptive strike, a massive retaliation ordered by Earth's military chiefs. Angry, looking betrayed, he said it had been plotted by second-level people who nevertheless had the power to set it in motion.

He brandished a paper he called a secret document. I tried to get him to hold it still so I could see it but he talked with an intensity that was working into fury.

Finally I was able to take the paper from him. It was a much-Xeroxed Jack Anderson column from an unidentified newspaper, undated. What looked like a memo from one high-ranking officer to another had been copied on the same page. It said something like "Great opportunity to try out Plan P.

Can we persuade K to consider?"

K might be Kronwald, a high functionary at the State Department. The names of the officers meant nothing to me.

I tried to tell Street that Anderson produced hundreds of columns a year and that not all of his informants could be believed. I tried to explain that chairborne officers in the Pentagon forever filled their time by playing war games. War was their trade, after all, but their games were just games.

"Policy is made at a much higher level," I said, and offered to seek out the facts from a friend who knew truth from talk and right from wrong and who, with his access to high places, could confirm that what alarmed Street was no more than a mongered rumor.

In fact, I offered to visit Dirk Easterly, who with his access to the highest councils, could guarantee that my interpretation was correct and that the Uxurans had nothing to fear from Earth.

"You would go?" Street asked, and I said I would, happily, to reassure him if he no longer trusted me.

He demurred, saying it was not me he distrusted but others.

How could he not trust me, I asked, if I was their prophet? This led to a philosophical discussion that ended with renewed assurances of his confidence in me—but only while I was with him, where he could keep an eye on me.

"That confidence will be immeasurably strengthened when you are resident with us on Uxu," he said. "Your high friend will then protect you and therefore us."

"It is not my wish to travel to Uxu," I told him. I don't know why I lied.

"Nevertheless it is the only solution."

"You would hold me hostage?"

"That is not a word we use."

"Captive, then?" I was indignant.

"You are our prophet and scribe," he said. "We have agreed to that; you are one of us. Therefore you belong among us."

"And if I refuse to go?" I was careful not to say I refused. The thought of Uxura was in my mind. But I'd have preferred to travel to her land of my own will.

"It is not a question of going," Street told me. "You are already on Uxu."

What he said after that made it clear that I had been transported to his land during the time-stop when the wave of cowed monklike figures descended the hill. This meant that the people of my friendly flea market were not the people they had been before. They were duplicates of the original Earthpeople, mockups created by the aliens.

My indignation returned. I told Street kidnapping was a federal offense. I said I would not be their scribe under duress. I said he had betrayed our mutual trust. I told him I could not live away from my beloved house in Auburn, where all my possessions were.

As if to placate me, Street said I would perceive no difference. All I had known would be the same. They had duplicated my house and everything in it just as they had replicated the flea market.

"Am I to be a prisoner in my own house?" I asked, feeling less annoyed. Thoughts of Uxura helped. Nevertheless I went on a bit: "Won't I be able to go to the Auburn Inn for breakfast? Can't I visit the library and museum?"

Street reassured me. Nearly a square mile of the territory around my house in Auburn had been duplicated in their interstitial way. Other requirements of mine would be met on demand.

I accepted the compromise, and told him so.

But why had I accepted? It was self-evident, now that I thought about it. It was my salvation as well as theirs. For them I was, if not a hostage, at least a guarantee that I would not let anything happen to them that I did not want to happen to me. The safety of their world depended on my well-being. My own well-being, indeed my future existence, depended on their environment offering an extended life expectancy. My days were numbered wherever I was, but the numbers were greater in the other land.

There were still other cards in my hand. I could set the terms. I could make demands. I could ask and what I asked would be granted because that was the way it was written in their book and I was the author of that book. I had only to take my fingers from the typewriter to wreck their plans. And so I asked, leaving it to them to agree gracefully, lest my reasonable requests escalate into demands which could not be denied. Mine was the pen that wrote their book of existence and it was a pen mightier than any sword they might wield. I ticked off my requests in a matter-of-fact way, as if to say These are the least of my needs, without which I cannot function, and there will be more, not needs but wants which I shall also expect from you.

Street looked troubled, and two or three times his face withdrew deep within his cowl as if he were communicating with a higher authority, but

he always agreed, and I wrote it that way and it became our compact, our contract.

My reconstituted house in Ux-Auburn was not altogether to my liking. They'd fixed me up more faithfully than I'd expected, but it wasn't home. It had a desk identically like mine but it didn't have the shelves of books that sat on the back of my desk at home—the rarely consulted but comforting books where I could look up, if I wanted to, the name of George Washington's dentist, the date of the crossing of the Rubicon, the words that rhymed with sang, the number of miles between Conventry and Stonehenge, the descriptions of ships I'd traveled in.

There was my typewriter but not the folders of manuscripts I planned to finish one day. Nor was there the big box of articles I'd torn from newspapers for later reference. A bookcase I recognized was there but it was empty of the books and magazines and scripts I'd written or contributed to. There was nothing printed at all, although there were a few reams of blank paper.

This alarmed me until I found that my typewriter produced words just as it always had. I had feared that no written words of Earth could exist on Uxu. There are many of them here now but all of them are words of my own, most of them those of this work in progress.

There was a refrigerator in the kitchen and there was food in it and on the pantry shelves but it was their kind of food, wholesome I supposed but unfamiliar. They didn't replace it until I complained. Then they provided Earth-style eggs and bread and butter and milk and coffee and other goods I de-

manded. They were all right but not altogether satisfactory. It was like the difference between getting my copy of the *New York Times* fresh on the doorstep each morning (they couldn't manage that) versus looking at a microfilm copy in a library years later. There's something about the genuine article. The reconstruction, the duplication, the replica—none is ever as good.

And of course they reneged on the library. The building was there, an empty shell, locked, but I could see through the windows that there were no books inside. The museum was there, not locked, and pictures hung on its walls but they were not titled and there was no reference materials of any kind.

There was no radio in the house and I missed that. I'd kept mine tuned to a noncommercial station that satisfied my tastes in music and my daily need to know what was going on in the world.

I missed the voice of Terry Johnson, the morning man on Auburn's FM station, who told me the time and what the weather was like. His way of speaking sometimes amused me. He used the odd aural punctuation of Radioland—"From our bin of golden oldies we have brought you the music of (a pause, longish for radio) Tommy Dorsey and now the weather."

And I remember that once he'd said "At 7:30 I'm Terry Johnson." I wondered who he thought he had been at 7 and whether he would be someone else at 8.

There was no FM set in Ux-Auburn but something else spoke to me. I became aware of it gradually. Many days had passed before I realized that someone had been communicating subliminally.

Rarely to me directly but to me among others.

The voice, if it was a voice, never identified itself but I came to know the speaker, or rather the transmitter of the words or thoughts, as Exus. The messages of Exus reached me not by transistor but inside my head. He recapitulated the important events of his world, not mine, and spoke occasionally of me.

It startled me at first to be referred to in this public way, to be singled out by this commentator as one of the important people of their world. I record in this narrative some of my impressions of him.

On one of Street's visits I asked him to tell me about Exus but he only smiled as if to say You invented him, you tell me. But I feel it's more than my invention here; there is a person whose words reflect Vox Populi, the Everyman of the Uxu people I know only dimly. I call him Exus because the name embodies the mandatory X and because from him, through him, come the thoughts and comments of the multitude of Uxurans I have been thrust among. Exus distills their feelings and gives them artistic form.

Unlike Terry Johnson, Exus knew who he was at all times and I heard him whenever he wanted me to. One of his first observations went something like this:

"Eggs he wants, and books by Dickens;
We have to evolutionize to chickens
And reproduce endless novels
At the expense of unroofed hovels."

Who is Exus and what is he telling me?

In describing Exus through his words I give you an alien scribe, not unlike me, who synopsisizes, compressing to stanzas what I'd need pages to say. He's a newsman of a certain kind, transmitting facts—sometimes flawed facts—fresh to those who hear his distillations.

I never did get the Dickens, or any printed matter at all, and I had to conclude that Exus allows himself a certain poetic license.

My alien colleague encapsulates complicated events into little space. I feel I have come to know him. I can't reach him but he reaches me. I endow him with certain freedoms of language and alien cliches. You'll grasp them in their context. Listen to Exus:

"Pens he craves and spending money
And a craft of bees he calls honey.
Halt the de-sal of a sea!
Hurry up and plan a bee."

But another verse was less harsh:

"I voice the words, the gripes, the woes
Of him who can't see past his nose;
Others see him as he's painted:
Our prophet come and partly tainted."

I sense a fraternal bond with this fellow of the alien airwaves. Both of us write. We seem to be of an approximate age, the fires of youth spent. That gives us a certain objectivity and a mordant way of looking at things. Neither is a hireling. We freelance, in the best and oldest sense of the word, defending truth and honor, telling what we believe is true. We

may exaggerate, ironically, to make a point.

Still, Exus is dim, I'll have to limn him, get him out from behind the scrim of mystery and myth.

Where does he churn out his stuff? High on an alien hilltop, it may be. I like to think of him there, in a golden afternoon, far horizons broadening his viewpoint.

I use a typewriter, a relatively recent invention. His instrument is an ancient but superior device through which his thoughts roam, to be edited—much as I might X out—until in a more Uxuran way they reach me and others.

I hear what he says and believe we think alike despite our differences. One difference is obvious: my words remain on the sheets where I type them; his fly to all his world—and to my ears now that I am a part of it.

Even as I write of him, he speaks of me:

"Is it worth it, many ask,
Bending to the ordained task?
Weighing prophet against loss,
Do we need you, Mister Ross?"

Exus has a bite to him, but he softens it:

"To steal his phrase, we knock on wood;
We need him for the greater good.
So let him have his precious bees
To put him at his proper ease."

Street visited from time to time to see how I was getting on, to talk, to know what I was writing about our mutual problem.

I was sorry for their troubles but I hadn't caused

them. I was sorry for Earth's troubles too, if the Earthpeople's resources were to be diminished by having to share them with uninvited visitors. If there was room for both, I wanted peace between us; if there was not enough room—I thought of Abe Burrows' parody of a popular song: You came to me from out of nowhere so why don't you go back where you came from?

But then there was Street's belief that the Earthpeople, or some villains among them, were prepared to obliterate the visitors who had been tossed on an alien shore and who hoped only for peaceful coexistence in a land with plenty for all—but could it be that its fabled wealth was limited? That its bounty was bounded by human overgrowth? That its largely empty continents would be overrun in a matter of decades by its own burgeoning billions?

If this were true it was easy to believe the "documentary" evidence Street had acquired—the widely disseminated warning that a secret group of Earthpeople had decreed doom for the Uxurans—a secret strike by paragovernmental forces of a dozen major powers that would annihilate the storm-tossed, the spacechanged involuntary immigrants. The Uxurans had asked only to share, at no loss to anyone, the interstitial wealth of a world whose surface resources were finite but whose submagma and supratropospheric treasures waited to be tapped and could be, easily, with the knowledge the new inhabitants had brought with them.

We had always welcomed refugees, up to now. With certain exceptions we had taken in the homeless, the tempest-tossed.

But now some people in the hierarchy wanted to

draw the line at alien aliens. Nowhere, they claimed, was there a mandate to gather flotsam from beyond the stars. They argued that this would threaten our own kind. We had had no compunctions about wiping out the anopheles mosquito, the tse tse fly, the scew worm. If we warred on fellow creatures such as these for the greater good of the rest of us, how could we extend friendship to even greater potential threats to our well-being? So spoke the exclusionists whose words, interpreted by Jack Anderson, had so alarmed Street.

I told Street it was unthinkable that the good people of Earth, most of them mired in poverty, should be deprived of a bounty beyond their belief by the act of a handful of irregulars whose fealty was to the status quo and not to the promise the aliens—no fellow terrestrials—held out to them.

Street was only half convinced, although I hinted that the Uxurans' spacechanged engines, instead of mining the jointly-held Earth and the resources below and above it, could harness their power in another way and, with their interstitial ingenuity, blow us all to kingdom come.

Street said: "If your irregulars attack, you share our fate. If Uxuran engines can mine your land and ours exponentially, you share our bounty. If we answer Earth's attack by invading interstitially, Earth is doomed. You are with us and will share our fate, whatever it may be. That is why you are with us."

There was tension between Street and me; tension I didn't need; a sullen standoff.

Street has gained presence on his native Uxu. The verses of Exus refer to him often. I sense that

Street speaks for his world virtually with full authority. He is far more representative of his people than I am of mine. If I could speak as he did we could arrange a summit meeting at this tired typewriter, manned by a tired scribe, and solve all the problems of two worlds. I acknowledge that I lack the kind of authority he has but he is content to wait, implying that as I chafe in my hostage status the solution will occur to me.

He is satisfied that as their prophet I will work out the details in a way acceptable to me and therefore to him. I am to be the Prince of Concinnity, with the burden of making gospel of a bold but unconvincing narrative. Poo-Bah's law. A dash of verisimilitude will do it if I can find the recipe, the key.

I find only the guide keys of my typewriter but am inspired to think Exus, my versifying colleague, may help. I address him directly. My words are poor compared to his but I trust him to hear the core of meaning. Exus the sweet singer of Uxu and Ross the freewheeling freelance of Earth, communicating in a transdimensional bond, seeking to avoid a stalemate, looking for a way to achieve a common good that transcends artificial boundaries. My words flow out in an Exuslike stanza:

"Are we close, my alien poet?
Is there a chance that we can go it?
I think there is; the door's ajar.
Are we friends? I think we are."

Exus does not reply. I am disappointed. I am restless. I roam the house, unable to sit at the typewriter. I wander outdoors and pace the

grounds. There is a lawn chair in the dappled shade of a tree. I sit in it briefly, then am up again. Without a book to hand I cannot properly relax; and there are no books on Uxu. Nothing to read except what I write, and I am growing sick of that.

I find the little garden I have started and abandoned. It is weed-choked. A shovel is stuck in the ground. I pull it out. Garden needs spading, I think. I shove it back in the ground. Dig is what a spade does.

I chop away at the weeds. Work is what a man does. Cry is what a babe does. What am I saying? Mewl is what a cat does. Bark is what a dog does. Drool is what a fool does. Drool? Stab is what a dirk does. Dirk? Heal is what a wound does. Drool? Dirk heal?

I run to the house, to the typewriter. I write the chaotic words and soon Street is there.

"I need help," I tell him. "I am only half effective without my blood brother, Dirk Easterly." I tell Street of our pact, of our mute witness, Drool the dog. "I have invoked our solemn agreement. Obviously he cannot come to me; therefore I must go to him. It is the only possible way."

Street is dubious. I can see he is torn between my persuasiveness as prophet and the possible defection of his hostage.

"Then keep me here," I say, "but send my image. It will be as real as the people at the flea market at the time I joined your cause. Yet my true self will remain to share your fate if my mission fails."

Street seems to listen to words I cannot hear. He is silent for some moments, then agrees to my plan to go to Washington across the dimensional divide.

"It will be done; with your special help, of

course," Street said. "Our programmers are relieved that no major recreation is involved. It will be a simple transsubstantiation, such as brought you among us."

"You mean I have to write it that way," I said resignedly. I was tired.

"You need not write it now. You will later."

"Oh? It sounds like a loan. I have to write it to make it happen. But because I will write it you'll advance me a trip that I'll pay for with a future account of it?"

Street almost smiled. "Describe it as you will. I believe your people have been known to trade in futures?"

Within an hour of my agreement with Street, after packing a small bag, I was set down, or I materialized—I can't describe it—at the end of the Glen Echo trolley line in suburban Washington. It had been my choice.

I don't know why I had wanted this means of getting to Washington. It stood to reason that the trolley line had been long abandoned, just as the Glen Echo Amusement Park no longer existed. Yet the pleasure of both lived in my memory; that must have been enough for Street.

"It's a nickel," the trolley car conductor said in answer to my question; "same as always."

I asked no more. It was a cheap and wonderful ride through the glen beside the waterway, the trolley bucketing along, its bell clanging at intersections or whenever the motorman felt like treading on the foot pedal in the sheer pleasure of transporting his passengers on a sunny day.

At the terminal I exchanged smiles of goodbye with my fellow passengers and found a cab whose

driver knew the old tavern where I was to meet Dirk Easterly.

Despite the many years between I recognized Dirk easily. He knew me too and with a clap on the shoulder led me to a booth where the waiter had set out two brimming beers in sweat-beaded glasses. I had been there last in the forties, when Dirk was off in the Balkans, or maybe the Baltic. "It looks the same," I said. "A little dustier, maybe."

"Nobody's dusted since Lincoln drank here, or so they say. Here's to Drool and the high school kids." We sipped in pleasure.

Stab (short for establishment?) was the bureau the OWI, OSS and CIA had evolved into. It was a unit of the executive office of the White House and of the United Nations, sometimes written STAB as if it were an acronym. The hundred or so people who knew about Stab occupied themselves in trying to pin down its function by making up a name for the letters: Space Travel Accessibility Bureau; Substation Terra, Authenticating Branch; Search, Travel, Assess, Bomb; Seek Terrestrialoids and Beneficize; Section Two, Alien Bureau; Scientists Terrestrializing Alien Beings; Something Traumatic Always Begins.

Dirk Easterly, my childhood blood brother, was a civil servant of awesome background, respected or deplored by his colleagues, consulted by the President but little known beyond a small international circle.

Dirk and I had gone to the same high school and had traded copies of H. G. Wells and Wonder Stories magazine. We'd seen each other only rarely since that time. There had been occasional post cards to each other from odd places on our sepa-

rate paths but there'd never been a call until today, when I'd sent him my message from Uxu.

We have had other bonds, he as a civil servant, I as a reporter. He'd known Tasha, who was Tito's woman in the Balkans, and I'd known Tasha. We'd both known Philip before he married his queen-to-be. We had played chess at different times against the same Russian who's been privy to the secrets of Stalin and Khrushchev and Brezhnev and we almost always lost.

He was Dirk Easterly of Stab and, as I had lately recalled, stab is what a dirk does.

His outward idiosyncrasy was to affect the trappings of a Hollywood-style soldier of fortune. He habitually wore a belted and shoulder-strapped trench coat and a pulled-down hat and almost always had a cigarette going in the corner of his mouth. I must have seemed as odd to him with my deliberately Ronald Colman mustache, my Dolittle-like note-taking on insides of match covers and margins of newspapers and my flea market business card.

Our reunion was pleasant. We drank beer and ate peanuts and gabbed of intervening years. We spoke of lost friends and recalled how it had been when we were among a precious few who were convinced that man would reach another planet or that men of another planet would find us.

We recalled our youthful appreciation of prophetic comic strips. Young Dirk had pasted up the Brick Bradford daily strips. I collected them later in Big Little Book reprints at fancy prices.

We understood each other. We associated still.

"Nov shmoz ka pop," Dirk said.

"The Nut Brothers, Ches and Wal," I replied.

"Thimble Theatre."

"Segar. Popeye and the Sea Hag."

Our oysters came, reminding me of the Potomac and the Hudson, which recalled Stony Point. "No dog shall bark," I said.

"Mad Anthony Wayne," Dirk said. "Melville; Ishmael."

"Ish Kabibble. Kay Kyser's Kollege of Musical Knowledge."

"Old-time radio. Hard times. Two chickens in every pot."

"Pot. The grass is always greener. It's better on the other side."

"The other side. We have seen the natives and they are friendly."

We paused as the waiter brought a fresh pitcher of beer. He set down two clean clamshell ashtrays and took away those we'd filled with butts and dottle.

"I smoke too much," Dirk said. "I just noticed."

"Why worry? You could be run down tonight by a Treasury truck."

"Or an interstitial alien."

"So you know." I told him what I'd been doing and he told me much I hadn't known. I said: "It seems unreal, here in Washington, but obviously I've been doing more than fooling around in a flea market."

Dirk said: "We're making policy here. What I recommend will be approved because hardly anybody else knows what it's all about. Are the Uxu a real threat? If they are you'd better tell me now."

It was hard to say, I told him. "Maybe it depends on how much I demand of them. The more I require, the greater the drain on their economy. I try

not to sap their energies too much when they're recycling waste or reclaiming a desert. But what will they do if they're convinced Earth is planning a pre-emptive strike?"

"They'll invade. Territoriality makes for inevitability."

"Only if I permit it," I said. "You see, what I'm scribbling here on match covers and what I owe them in manuscript is the definitive text. There's something cabalistic about them. What I write will happen."

"You're writing their constitution?"

"I'm writing something; it's more like their Bible."

"And what you prophesy will come to pass?"

"As in our Bible? 'Now write what you see, what is and what is to take place hereafter.' Revised Standard Version. Or, in the King James: 'He knows the future and is able to control it.' Others have said it. So it would be more exact to say that what I write is happening. Or that what I've written has happened. I'm their historian and when I say something is so, it's so. Irrevocably."

"You sound as if they've made you their god. Why would they do that?"

"I don't know that they have. Prophet, they call it. They seem to trust me."

"Is that trust deserved?" Dirk asked. "Do they know what we're talking about here?"

"They'll know what I've written. I owe them that. I consider you the guarantor of the stability of two worlds."

"You believe that."

"Once I wouldn't have," I said. "I do now. Maybe they'll include you in their prayers. The great brother god. God Brother of Stability."

"Would they offer up nubile maidens to me?"

"If I wrote it that way. Is nubile maidens what you want?"

"Not in groups. I'm your age, you know. But one at a time? That's a kind of benefit I don't get from Stab."

"Then you shouldn't expect it from the Uxu."

"Let the sacred writings show that I'm only kidding. Make me a small-g god with a sense of humor. Unless you're in upper case; then I'd expect equal billing."

"I don't want to be God or a god," I said. "I should make that clear."

"I'm glad you did because it wasn't clear to me. I'd better sort out what I'll have to tell the President. He may not want details at this point but I've got to be ready for him."

"What does he know so far?"

"He has the facts on the Uxu. Where they are—coexistent, dimensionally, with us. He isn't concerned about them now and neither is the Sec-Gen. You do know I report jointly to the White House and to N. K. Mboto, Secretary-General of the United Nations?"

"I've kept track. Then your guarantee is also that of the UN. Anything you've said, over beer and oysters here, is what Earth says. Is that right?"

"It's right enough," Dirk said. "But don't forget that if what you tell me about your prophesying is true, the Uxu are only an incantation away from being physically among us on Earth. So watch your language. They can have their interstices and we intend to keep ours. I'm depending on you not to write anything you don't want to happen."

"I give you my word, blood brother."

"Good enough. Somebody has to advise the White House and the UN on the interstitial situation. Stab does that. And for all practical purposes I'm Stab."

"With the same disclaimer, I'm Uxu," I said. "Then if you and I have a drink on it, it's as good as a treaty. Is that right?"

"We shook hands and drank some beer. The stability of Uxu and of Earth was assured. There's a way of doing these things."

We went to Harvey's for a seafood dinner. Afterwards we got a cab and Dirk dropped me off at my hotel, where I wrote up what you see here, paying my debt to Street.

I finished typing my notes in the Washington hotel after leaving Dirk—fulfilling my futures contract with Street—and considered my return to Uxu. I was looking forward to getting back; anxious, in fact. I'd had my sentimental journey on the Glen Echo trolley and wanted a faster return trip.

The businesslike atmosphere of the capital almost made me forget that I had the means at hand—the rented typewriter I'd been pounding for an hour. I rolled a fresh sheet of paper into it to do a postscript. But I found my fingers writing:

"The threat of interstitial kill
Was lifted by our Prophet Will
In concert with unstabbing Dirk —
What a lovely piece of work!"

Unmistakably Exus. So they already knew.

Later I wrote, of my own volition, that I was tired and ready for bed. That I would prepare for sleep in

Washington. That as slumber neared I would prophesy that I would wake in my house in Ux-Auburn. That I would have a reunion breakfast among friends.

It happened.

Except that there was only one friend. "I'm glad you forced us to invent the hen," Uxura said as she served eggs, whole wheat toast and coffee.

I was delighted to see her but wondered where Street was.

She said she had sent him on his way. "He has much to do. He was glad to shed his diplomat's cloak and get back into his more comfortable laboratory jacket. His job is to halt the building of war engines and convert our economy to peace and trade with our new-found friends. There is much we can share with you."

We talked of that for a time and I said: "Then Street really is Uxu's top man. I rather suspected it."

"Yes; he's inherited his father's genius and whatever I've been able to give him. My son has done well and I'm proud of him. He has earned the right to be top man, as you call it. But he's not the boss."

"Oh?" I was confused. "Then who is? Will I meet him?"

"Not him," Uxura said. "And we have already met."

I could only look at her, wordless, as she poured more coffee.

"It was not always so," she said. "You told us of the space change we have undergone. We learned many things from our Prophet Will."

Speechless still, I lifted my cup. Then I said inanely: "You make excellent coffee."

"That too," she said, and smiled.

Then she said: "My instincts are important. I'm not just a woman—I'm Woman, from far back. And woman's instincts are more than just feminine intuition. Our whole experience shows we have age-old ways of knowing more than we are credited with."

I knew what she was talking about. I'd read in a journal that women had greater sensitivity to the character of others, a sensitivity honed by the needs of thousands of generations of silent subservience to the more powerful males of their tribe or society. The enforced silences gave them opportunity, more than their men, to be attentive to non-verbal signs, to store up knowledge thus learned and to be able to act on it in time of danger. Not only mothers protecting their children were respected by the men for their instincts, but older women with acknowledged abilities became high priestesses whose canniness and prescience were respected by all in the tribe.

And then we talked of things that need concern no one else. There was a kiss of a kind different from the one at the flea market and we made certain plans . . .

And then there was a glimmering of subliminal thought that turned to words inside my head:

"There's a later bridge to cross:
Could you share a woman boss?"

I knew she'd also heard it. She was smiling sweetly, eyes cast down, looking almost girlish.

I didn't answer the question. I said: "You're not Exus too?"

"No, no," she said, "though he is all of us, as you said his name implies." She added softly: "You didn't answer the question."

"You must know—" I began. "I think I prefer to write the answer. I will do that soon."

"That will be fitting," she said. "I am content to wait."

"It will take only a little while," I said. "I'd like to go back to the flea market to do it properly. May I?"

"Street will escort you," she said and Street appeared at the door, looking interrupted. His mother explained. "It's our prophet's sense of concinnity," she said. "Take him there one more time."

"I have missed some of the narrative, being busy elsewhere," Street said, masking annoyance.

"You will know it later, at your convenience," his mother said. "Take him there now. It is his obligatory scene. We have our ways; he has his."

Street took me there; it was the place I had known.

One asks: Was my trip to Washington an actuality or was it a theatricality programmed for me by the Uxurans? The question is academic. By their own rules what I have written is fact because I have written it. It is so. Ask Street or Exus or Uxura. Ask Dirk Easterly. Ask the President of the United States or the Secretary-General of the United Nations.

Ask ten-year-old Henry, for whom I also write.

Things happen or they don't. This happened. Has the sun risen? Does a bird sing in a tree? Can you go for a walk or kiss your beloved or pick up the phone and have a pizza delivered?

Everything is as it was, pretty near. What's good is still good and what's bad is still bad but, by and

large, aren't you content?

We're coexisting with an alien race, not on our block but just around a dimensional corner, and we're still very much alive. Nothing has changed that wouldn't have changed anyway, for better or for worse.

Contrariwise, nobody is taking up cudgels against the foe. Nobody hankers today to go with pike and sword to Christianize the infidel, or to loose uncontrollable weapons to make the planets safe for our particular brand of life. Probably we've had enough crusading in foreign climes, minding other people's business when there are injustices of our own to correct.

It would be good if this were so. I hope it is.

In fact, the power of my word being what it is, I decree it.

As for them, their way is that of a peaceable people. As they borrowed my mind and familiarity with Earth to give them what they needed, so did I permeate their destiny to prevent them from harming us. And I've absorbed enough of their knowledge to benefit us all in ways that will be apparent in good time. Their space change has affected us as well.

They are as incapable of waging war on us as I am incapable of letting it happen in these writings. As Dirk Easterly cautioned me solemnly: "Don't let the moving finger write anything it couldn't cancel out."

It's my finger he was talking about. I won't let it happen.

Is that a strong enough guarantee? For me it is. Either you take me on faith, you of Uxu and you of Earth, or you gave up on me some time ago. If

you're still with me you must be convinced that a common-sense arrangement had to be made to keep things from exploding. And sometimes things are arranged by concerned people of less than the highest rank who are accidentally well placed, like Dirk and me.

It may be a flimsy reed to lean on but if we lean gently and keep talking to each other, all of us may survive.

William Wylie Ross was nearly at the end of his story. The back of his neck hurt because he had sat so long. He pulled the last page from the typewriter, put the sheets together and handed them to Street, who waved them away. "I know all that you have written."

"Is that how it will happen?" Ross asked.

"It is the way it has happened," Street said.

Ross looked around. Many dealers had left and others were packing their wares, folding their tables. The Victrola Man was playing a coda: *Good Night, Ladies*. Few customers remained. The sun was low.

"It's hard to believe I'm on Uxu," Ross said. "Or have I gone and come back?"

"You are where you want to be. Call it Earth, call it Uxu, call it simply the First Original Famous Flea Market. They're all yours, you know."

Ross looked at the familiar land and sky. Cars went by on Route 3. A man took down the roadside sign that said Flea Market Every Sunday May to Oct. Park in Field Below.

"It's quite real, isn't it?" Street said. "Can all of us be merely the product of your imagination? Be satisfied. Hasn't it been a good day?"

"We've traveled in time?" Ross asked. "After all that has happened everything is the same as it was?"

"We are here, now or again. It is a good moment in time, which is relative, anyway. Why limit it by tense? You question too much."

Ross examined the scene he was told he'd made. He looked for flaws, for the possibility that it would dissolve like a dream or the end of a movie. Nothing changed. It was as solid and simple as any warm Sunday afternoon in the field back of the old farmhouse that was the weekly summer setting of the First Original Famous Flea Market.

Mrs. Ellis, from three tables away, brought doughnuts in a paper napkin. "Last Sunday the sugar glaze didn't go well," she said. "This time it's the cinnamon sprinkles. I know you like both. Give one to our friend."

"Thank you, Mrs. Ellis," Ross said. "When will you let me write your story? On the house, of course."

"Oh, some day when we're all less busy. I'll come over; I'll be your shill."

"Do that, Mrs. Ellis. Thanks for the doughnuts." To Street he said: "Mrs. Ellis used to work carnivals. She's a pro."

Street smiled at her. "I've eaten Mrs. Ellis' doughnuts before. Thank you, ma'am."

"You're welcome, Mr. Street. I hope you enjoy them." She went to pack up.

Ross stood and stretched. "I suppose you'll tell me I wrote that dialog in my head, on Uxu."

"Sure you did," Street told him. "Shall we go?"

"Where?"

"To your house in Ux-Auburn and all that awaits



you there."

"How? As easily as we came?"

"Yes, or, if you prefer, in your Volkswagen."

"Let's go, then. No, wait. Henry and his father are still here."

"The boy you wrote a story for?"

"Yes. I want to do something for him. Maybe he'd like my typewriter."

"Make it happen, then."

Ross sat and relit his pipe. Then he wrote:

"This typewriter, once for hire, is now at liberty. W. W. Ross needs it no longer. Take it and use it. Dowidzenia, Henry."

Mr. Ross had been in plain sight when Henry decided to go back and say goodbye. But when Henry got there, after walking around a truck, Mr. Ross and the other man were gone. There was only the typewriter on the table with the note in it.

Henry asked: "May I have it, father?"

"He means it to be yours. It would not be courteous to refuse."

Henry's father carried the machine to the back of their station wagon and Henry jumped up on the tailgate. Henry rolled the paper a little and, using two fingers, typed: "Dowidzenia, Mr. Ross. Good-by, sir."

"Is that the end?" somebody asked.

"That's the end," Ross said. It was written.

It was almost the end.

Henry sat in the back with the typewriter as his father drove away. Under Mr. Ross's words he typed, just for fun:

"A man at a flea market .

●

THE THIRD INDUSTRIAL REVOLUTION

THE BRILLIANT new science FACT BOOK
BY G. HARRY STINE

\$1.95

read ABOUT HOW we can make nearly everything in space we make on earth at a comparable or lower price and DO ALL THIS WITHOUT TAPPING terrestrial energy or POLLUTING the environment!

"The book's excellent. I'm going to recommend it!"
—Arthur C. Clarke

"Stine is one of the most provocative and imaginative thinkers in the area today."
Gene Roddenberry,
Producer of *Star Trek*

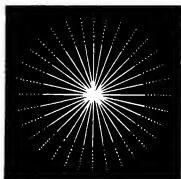


A ace science FICTION

Available wherever books are sold, or order by mail from book mailing service,
Box 690, Rockville Centre, N.Y. 11571. Please add 50¢ for postage and handling.

SPIDER
VS.
THE HAX
OF SOL
III

BY SPIDER ROBINSON



A History of the Hugo, Nebula & International Fantasy Awards, Donald Franson & Howard DeVore, Misfit Press, 112 pp., \$3.50

Chrysalis II, ed. Roy Torgeson, Zebra, 284 pp., \$1.95

Retief At Large, Keith Laumer, Ace, 440 pp., \$1.95

Retief of the CDT, Keith Laumer, Pocket, 191 pp., \$1.75

Retief And The Warlords, Keith Laumer, Pocket, 175 pp., \$1.75

The Girl, The Gold Watch And Everything, John D. MacDonald, Fawcett, 207 pp., \$1.50

Mindswap, Robert Sheckley, Ace, 213 pp., \$1.75

Fireship, Joan D. Vinge, Dell, pages unknown, \$1.75

What Mad Universe, Fredric Brown, Pennyfarthing Press and Bantam (separately).

The Unknown, ed. D. R. Bensen, Jove, 192 pp., \$1.75

This is a cumbersome communication we have going here, you and I, a kind of time-travelly, science-fictional relationship.

As I write this sentence in my trusty notebook it is October 1978. The first issue of *Destinies* is just beginning to hit the stands. You are just getting to know me. You are just getting to know *Destinies*.

As you read this sentence in your trusty bookazine, it is *April* 1979—and since paperbacks have a longer shelf-life than conventional magazines, it may be considerably later. By now you are a devoted fan of this column (you're reading it, aren't you?) and *Destinies* is an established hit (same reasoning applies).

As I was preparing this column, I glanced over the last one, the one that *you* read two months ago, the one that from *my* frame of reference won't see print for another two months. The one about the Hugo Awards and why you ought to vote for them. Paradox. Two months from now—*my* now—you are going to read that ". . . my wife Jeanne and I happen to be up for a Hugo for our novella 'Star-dance,' and don't I wish I knew now what I'll know when you're reading this." A month ago—again, *my* ago—Jeanne and I came back from the World SF Convention with a pair of Hugos clutched in our fortunate fingers. They (the rocketships, not the fingers) already need dusting—but by the time you *read* this, they'll be six months old, and I may even have stopped wearing mine as a tie tack.

Effectively you and I are communicating across 1.93155×10^{12} (what the hell, call it two trillion)

miles of interstellar space, limited to lightspeed. We have a transmission lag of approximately four months. Like that old gag about how it's okay to step on a brontosaur's tail because you've got a good half hour before he finds out.

So if I seem a little slow in reacting to your feedback, please forgive me. It's just that I haven't *seen* any yet. And thanks to the inside-workers of the Canadian Postal "Service," who annually cripple their country with a mail strike in rage at being forced to work 28 hours a week for 40 hours' pay, sorting paper in a climate-controlled room, I am not likely to see any feedback until the day this column gets mailed, if and when (or any paychecks, or contracts, or books to review, or birthday cards, or market reports, or . . .).

So in the meantime I'll just have to keep addressing this column to the same imaginary "you" that I've been talking to since I started this: the hypothetical casual reader of sf paperbacks.

I don't know of any actual specific surveys or studies done on you—whenever anyone tells me about you, the authority they usually cite is "my many years in the industry." But they are unanimously agreed that you are probably *not* an sf magazine reader (or weren't until now, of course), and probably do not consider yourself an sf "Fan" in the classic sense. You may not even really grasp what the term implies. You may not care. You like to buy a paperback now and then, and you would like it should be good, is all.

So how do you know what's good? There's this column, of course, but I cover a maximum of eighty or ninety books a year, and they publish better than a thousand in that period of time, new and reprint.

Well, one reasonably reliable principle is to select authors or specific works that have won Hugo or Nebula Awards (he said smugly). It's not foolproof—nothing is—but it's a start. Ah, but how are you, the non-fan, without a fanzine or a con report to your name, supposed to know what has won or been up for awards? One of the little oddities of this business is that the awards usually get given out *after* paperback publication, or too late to revise the cover—so a lot of award-winners are not so labeled. Also-rans hardly ever are, even if they lost by a handful of votes. And come reprint time, adding the blurb that says "Hugo Winner" or "Nebula Nominee" or whatever often turns out to be precisely the kind of little detail that gets overlooked. Half the time the editor who bought the book has gone elsewhere and the new person doesn't remember because it wasn't his/her book (my experience has been that sf editors seldom stay at the same desk for more than three or four years. I think the record is twenty-four hours.) So how do *you* know?

Easy. Send \$3.50 American to Howard DeVore, at 4705 Weddel Street, Dearborn Michigan 48125. He will send you (provided you remember to ask for it) *A History of the Hugo, Nebula and International Fantasy Awards*, a splendid and informative 112-page booklet compiled by Donald Franson and publisher DeVore.

Frankly this one snuck up on me. As a writer, I was reasonably familiar with the Hugos and Nebulas—or so I thought—and so I took it upstairs to bed with me one night as nod-off reading. I kept Jeanne up for three hours reading aloud from it, and at dawn I was still turning pages.

For one thing, there are the fascinating intros, giving background on the awards and their evolution. As near as I can figure, the longest the Hugos have gone without some major change in rules or procedure has been about two years; the Nebulas the same.

For another, Franson and DeVore are thoughtful enough to include not only winners but nominees—so that I not only marveled at some of the things that have won awards, but also howled at some of the incredible things that have *lost*. All kinds of ironies and paradoxes: did you know that the year Brian Aldiss was up for Best New Writer, the winner was No Award? Or that three years later Aldiss *won* the Short Fiction Hugo for his "Hothouse" series? Or that Heinlein's *The Moon Is A Harsh Mistress* lost the '66 Hugo and won the '67 Hugo? (Its magazine serialization ran from December through the following April, and it was ruled eligible both years.) Or that the year Vonnegut's *Cat's Cradle*, Herbert's *Dune*, Heinlein's *Glory Road* and Andre Norton's *Witch World* were all up for the same Hugo, they all LOST to Cliff Simak's *Way Station*?

Having whetted your appetite with this enormous menu of goodies, Franson & DeVore are kind enough to list after each entry either the publisher of the book, or the name and issue of the magazine that ran the story—so you can find them with a modest amount of spadework.

Sensing that it would be a lot more work and embroil them in bitter controversy, F&D were wise enough not to attempt any tabulations. I am not so wise; here's what I come up with: the man with the most Hugos on his mantlepiece (unless he's

hocked some) is Kelly Freas, ten times voted Best Professional Artist. Although a typo (the only one I've found so far) in the index seems to credit Dick Geis with ten Hugos for Best Fan Writer and Best Fanzine, upon careful recheck I confirm only nine. ("Only," he says.) As far as professional fiction . . . well, as of the '76 Nebulas and '77 Hugos—the cutoff date for the edition I have here—the all-time award-winningest professional writer was Fritz Leiber, with 8 Hugos and 2 Nebulas. Harlan Ellison was nominally tied with 8 Hugo *citations* and 2 Nebulas, but two of those citations were Special Committee Awards, plaques (for the Dangerous Visions anthologies) and not actual rocketships. As of now, however (1978) Harlan must be said to hold the righteous lead, having just copped both Nebula and Hugo for Best Short Story with "When Jeffy Is Five." Final count as we go to press: Leiber 8H + 2N; Ellison 7H + 3N + 2HSCA. And the writers with the most Nebulas (awarded annually by vote of the Science Fiction Writers of America) are Robert Silverberg and Samuel R. Delany, with four apiece.

Oh, and the International Fantasy Awards, something I had always wondered about, turned out to be an odd story. Originated by four British fans for the 1951 British convention (predating the Hugo by two years), the IFAs were thereafter awarded by an "international panel" which I understand occasionally included Anthony Boucher. A total of nine were awarded over seven years (1951-5 and 1957), for both fiction and nonfiction. Fantasy nonfiction? Near as I can see, of the nine winners and eight other finalists exactly two were works of fantasy (John Collier's *Fancies And Goodnights* and Tolkien's *Lord Of The Rings*); the rest were science

fiction or science fact. The award itself is pictured here as a spaceship of dubious design with what appears to be a silver tomato at its base, and the awarding procedure was more haphazard than even the Hugos and Nebulas. Such an odd little award might seem to be worth less space than I'm giving it here—save for one thing: that international panel had *incredibly* good taste. The brief list includes some of the finest work done in this field, and only one of them is to be found in the Hugo and Nebula lists. Why, if you just went to a second-hand bookstore (or, if you have more time, a minute-hand bookstore) and bought every IFA winner, you'd have several months worth of fine reading, and still get change back from your twenty. No, I'm not going to list them—go buy the book.

This intelligently organized, carefully indexed, lovingly hand-stapled booklet is a definitive reference work for those who know and love science fiction, and an invaluable buyer's guide for those who are just good friends. Oh, and by the time you read this, the new edition will be out, incorporating '77 Nebulas and '78 Hugos.

I suspect that most casual readers of *sinus friction* tend to play the percentages, to stick with big name authors and large, experienced publishers. That's not a bad general rule of thumb, but it can play you false. It could, if you're not careful, cause you to miss out on *Chrysalis II*.

"Zebra Books" *sounds* like precisely the sort of publisher one should instinctively steer clear of (how about "Embarrassed Zebra Books": black and white and read all over?). And Zebra's sf editor, Roy Torgeson, will be familiar only to those of you dedi-

cated enough to collect recordings of authors reading their works: Roy's *Alternate Worlds Recordings* has Sturgeon, Leiber, Le Guin, Ellison and others on disc and cassette (catalog from 148 East 74 Street, New York² 10021). Furthermore, only five or six of the fifteen names in the Table of Contents are going to ring a bell. Nonetheless, there's good times to be had here.

Curiously, only a little of the enjoyment comes from the established Names. The outstanding exception is Kate MacLean's "Canary Bird," a brilliant short story that cuts like a hot scalpel; I'll be disappointed if it doesn't turn up on next year's Hugo list. Ted Sturgeon's introduction and story prefaces are pleasant, but then I would happily read Ted's tax returns. And I confess that I sneakily enjoyed Philly Joe Farmer's "The Last Rise of Nick Adams," which (in startling parallel to Harlan Ellison's "How's The Night Life on Cissalda?" in *Chrysalis I*) is essentially an extended dirty joke, utterly gross, repeatedly libelous and quite funny—but I couldn't call it Major Farmer. And the Lafferty . . . I agree with Sturgeon's preface that Lafferty "is the result of the ecstatic union of a power shovel and a moonbeam"—but about three years ago, for reasons I cannot yet nail down, I stopped enjoying Lafferty stories. The Richard Lupoff piece, "The Devil's Hopyard," is, like his story in *Chrys I*, a Lovecraft pastiche, this time a sequel to *The Dunwich Horror*. This may suit you fine; unfortunately for me, Lovecraft leaves me . . . rather, *fails* to leave me cold.

Things begin to pick up, though, as the names get less familiar. Some of you may know Thomas Monteleone and Robert Thurston, writers worth watch-

ing: both their stories were quite good, particularly Nebula-winner Monteleone's "Just In the Niche of Time." You may also know Mildred Downey Broxon: her "Where Is Next Door?" is one of her very best stories to date, a tragic joy to read. Of the folks you probably don't know, I would say that I was adequately entertained by Craig Gardner and Jayne Tannehill, and significantly impressed by Elizabeth A. Lynn, David Drake and Karen G. Jolie, all of whom show enormous talent and skill. The two I didn't care for were Evelyn Lief's "EMMA," which just tried a bit too hard to ring my chimes, and Alan Ryan's "Dragon Story," a non-story characterized by the kind of pretentious self-indulgence that only Tom Robbins can even occasionally pull off (which is not to discourage Lief or Ryan, by the way: there are worse stories than these in *my* trunk, marked "sold").

The book totals out at between 80 and 85% on the Spidermeter $\left(\frac{\text{stories enjoyed}}{\text{total stories}} \times 100 \right)$, and damn few anthologies go that high these days.

Let's look at some Old Pros for a while. It has been a VERY good season for reprints.

For instance, I love Keith Laumer's Retief stories, and suddenly they're popping up everywhere.

Critics have complained that they are low-brow juvenile action-advencha type stories, peopled with nothing but stereotypes and damn near nothing but male stereotypes at that. I cannot argue, and there's no question in my mind that if you made a Retief movie it'd have to be an animated cartoon. But dammit, they're so much *fun* to read!

Jame Retief is a galactic diplomat. He appears to

be, in fact, the *only* member of the Corps Diplomatique Terrestrienne with any ethics, principles or goddam brains. Incredibly strong, handsome, fast, courageous, competent and witty, Retief is willing—nay, eager—to break CDT rules whenever it suits his peculiar personal code (virtually indistinguishable from The Code of The West), and he perpetually manages with urbane ease to save Decent Fōlks (human or alien) from enslavement by the evil rotten Groaci, *despite* the incompetence and treachery of his nominal superiors, venal boob Ambassadors named Grossblunder or Thunderstroke.

Each Retief farce features at least one brilliantly zany race of aliens, nearly always with a characteristic dialect (some speak Igpay Atinlay; some flowery Elizabethan; some spoon in speakerisms; backwards speak them of some and). Each story has a plot so simultaneously tight and loony as to be worthy of P. G. Wodehouse by way of Raymond Chandler. And each is devastatingly, venomously funny, satire more broad and less subtle than, say Pohl & Kornbluth, but no less worth the turning of the page.

Now: Pocket Books has a nice Retief collection out, *Retief of the CDT*. Ghastly cover, uncredited, but what the hell. Five very prime Retief stories, "Ballots and Bandits," "Mechanical Advantage," "Pime Doesn't Cray," "Internal Affair," and "The Piecemakers"—all for a buck seventy-five.

But—for twenty-five cents extra, Ace Book's *Retief At Large* will give you four of those selfsame five stories (excepting "Internal Affair"), *plus* seven others equally good or better, more than twice the total number of pages (440 versus 191), and the Bob

Adragna cover painting is quite good. Don't ask *me* how the duplication came about, I just read here. All I know is that "The Brass God," "Saline Solution," "Dam Nuisance" and especially "Grime and Punishment," available only in the Ace edition, are among the very best and funniest Retiefs. So, it must be admitted, is "Internal Affair," available only in the Pocket—but it ain't worth \$1.75 by itself.

(Unless you are a collector of literary trivia: the texts of all four duplicated stories are not *precisely* duplicated. There are subtle differences. *Some* body copy-edited one or both. All the changes I've spotted so far strike me as utterly insignificant and unaccountable. I've written to Keith asking him about all this, and he telegraphed acknowledgement—but the postal "workers" are sitting on his letter of response. Maybe next issue.)

Pocket Books does, however, have the current corner on the market for Retief *novels*. As far as I know, there are only two, and I haven't seen a copy of the splendid *Retief's War* (my own introduction to the series) in a mort of years—my copy's gone, and I don't know who owns the rights.

But *Retief and the Warlords* is damn near as good. How can I convey its madman, Firesign-Theatre-ish humor? It involves ferocious aliens called Hatracks, and the funniest parts in the book are the torture scenes and the public execution, and Retief crashes at least a half dozen spaceships without hurting himself and wins a war without straining and it's just marvelous. At least one enormous *deus ex machina* has to be swallowed whole to make the plot work, but it's a legitimate science fiction device, and Keith uses it brilliantly.

The whole Retief saga is good, well-constructed

entertainment, designed to be read at breakneck speed. The key word is clever.

Another Old Pro. I have a private hunch (based on "my many years in the industry") that most of you sf paperback readers occasionally check out the *rest* of the bookstore too. I suspect that most of you are at least peripherally aware of John D. MacDonald—at least his extraordinary Travis McGee series, if not the forty-'leven thousand other titles he's published. What you may not know is that MacDonald briefly worked in the sf and fantasy fields. Briefly means he only turned out three fair-to-excellent novels and two or three dozen terrific short stories which are endlessly anthologized before he gave it up as just not profitable. Call it six months.

The two novels that are just fair-to-good are *Wine of the Dreamers* and *Ballroom of the Skies*, and I don't know if Fawcett has them in print now. But they did send me a review copy of the one that's good-to-excellent, *The Girl, The Gold Watch And Everything*, and it was a genuine pleasure to re-read it. In a way it is very similar to the Retief stuff, farce with overtones of suspense-adventure. In a way it is *startlingly* similar: the book is based upon the same exact deus ex machina that saves Retief's chops in *Warlords*! (I hasten to add that I am not hinting at plagiarism, regardless of who published when. You don't copyright ideas, you copyright arrangements of words, and there are surprisingly few new ideas in sf, and this one was old before either of these books was written.) Like Laumer's book, *TGTGWAE* is tightly plotted and wildly funny, thoroughly thought out and quite clever.

What raises *TGTGWAE* a substantial notch above clever, to my mind, is MacDonald's characteristic characterization. In even the worst of his early, inexperienced paperbacks, MacDonald's people are only very occasionally cardboard; major characters, be they hero or villain, invariably live and breath and make me hurt with them. I don't know out front that the hero is going to effortlessly save the day—right up to the end of this book there seems a substantial possibility that Kirby Winter isn't going to end up with the girl, the gold watch, or *anything*.

And I *care*, that's the main thing. Kirby is, when we meet him, a kind of ineffectual nebbish—but he is such an immensely *likeable* nebbish that we have a reason to cheer as we watch him slowly and plausibly mature before our eyes in response to events that happen to make an exciting story.

And though God knows that some of the characters in this romp are a bit on the stereotypical side, that old MacDonald magic makes them all come to life somehow. I am especially enchanted with Miss Bonny Lee Beaumont, the most unlikely and marvelous heroine I've run across in a long time.

This one you read just a bit slower, and have maybe just a little less fun and a hair more enjoyment. It's still "just" a good light entertainment. The key words are clever and warm.

Next a genuine forgotten masterpiece, from one of the cleverest and weirdest of us all.

I have always loved Robert Sheckley. I have mouldering copies of at least a dozen of his short story collections in storage, and I don't know of anyone else in sf who has written quite so many

really classic stories. His brand of humor is so uniquely and distinctly *his* that I despair of describing it to one who does not know him. I guess I would call it (with some trepidation) wittier than Pohl, more mordant than Kornbluth, nuttier than Lafferty, blacker than Lenny Bruce, subtler and more bent than the Firesigns and Monty Python put together, and zanier than anything Alfie Bester ever wrote. Frank Zappa has publicly acknowledged his debt to Sheckley, and I hereby acknowledge mine.

And I never read Sheck's *masterpiece* until just this month, when the Ace reprint beat out the mail strike.

How can I convey to you what it was like to read *Mindswap*? I suppose a roughly similar effect might be obtained by washing down a milligram of acid with a quart of Metaxa and then watching PBS, CBS and CBC on three TVs at the same time for a few days. I'd guess you might obtain a comparable product by chaining Hunter Thompson, S. J. Perleman and the ghost of James Joyce to the same typewriter and cracking the nitrous oxide. If an infinite number of monkeys had typed on an infinite number of typewriters for an infinite number of years, it is possible that they might by now have generated between them something so simultaneously unlikely and inevitable as *Mindswap*. But I doubt it.

A plot summary is completely out of the question—in fact, I would love to see the outline from which Sheckley sold this—but the premise is reasonably simple. Marvin Flynn answers an ordinary, commonplace classified ad from a Martian named Ze Kraggash, offering to swap bodies for a

month. But when he gets to Mars, he learns that the unscrupulous Ze Kraggash has sold the same body to several poeple at once (shades of Keith Laumer), and skipped with the proceeds. Possession goes to the earliest claimant, and Marvin ain't it—so he has six hours to beg, borrow or steal another body before he is evicted! His only ally is a Martian detective who is bursting with confidence because he failed to solve his first 158 cases, and the odds of a string like that continuing are astronomical ("I could probably sit here in my office and do nothing, and the criminal would find his way to me: that's how strong the probabilities are in my favor.") In despair, Marvin rents his soul out on the open market and soon finds himself well on the other side of the Looking Glass, at least three reality-levels away.

This is just the opening—from there it gets *crazy*. By the end of the book Marvin might be likened to a man hanging by his fingertips from the rim of his own anus to keep from falling out—and fall out he does, by God, into the dread Twisted World itself! And no, I'm not giving away the ending—that lies beyond the power of mortal man.

Try *Mindswap* by all means: it will turn your mind to peanut butter. The chunky kind.

And you should by no means miss *Pilgrimage to Earth*, a reprint-collection of Sheckley short stories from Ace. Only one is poor (ironically, the only one that sold to John Campbell at *Astounding*), and the fourteen others range from very good to stunning.

The key words with Sheckley are clever, deadly cool and crazy as a bedbug.

Joan D. Vinge is a comparative newcomer to sf,

whose work I have greatly admired since she first started writing professionally on her own three or four years ago (for some time prior to that she wrote in collaboration with her husband, Vernor Vinge). Apparently I'm not alone, either: last month (September 1978) Joan won the Best Novelette Hugo at Iguanacon, for "Eyes of Amber." I met her there, and she is a new but already a good friend.

Now, Dell Books has just begun a series they call Binary Stars, in which each book has two novellas by different authors, kind of like the old Ace Doubles. But the galley they sent me on *Fireship* is clearly marked, "Not a Binary Star," and it is, believe me, unusual for one author to get a book contract for a pair of novellas. Plainly, Dell was crazy about these two stories, so I had every reason to go in with high expectations.

And dammit, even with my thumb in the scale for friendship's sake, the highest I can goose the Spidermeter is a lukewarm 65%.

Here we have two half-a-book stories, as unlike as yin and yang. Both are, in their separate ways and on their separate terms, built of terrific ingredients. And both just fail to work, delivering on about 50% of their promise apiece.

The first, "Fireship," will be published in magazine form two months after I write this and two months before you're reading it. It is whatcha call a typical *Analog* adventure yarn, kind of an imitation of Roger Zelazny imitating Raymond Chandler, wisecracking first-person narrator, lines like, "I straightened up, wishing fervently that I could give myself a partial lobotomy." Nothing wrong with this at all, so far, I hasten to add: I've written plenty of these myself and will probably

write more.

But that wisecracking style is the hardest thing in the world to pull off, and if you just miss it sets the teeth on edge. I'm willing to admit that I have just-missed on frequent occasion, and I think Joan just misses here. Lines like, "I woke up groaning out of a dream that I'd just had my head shrunk, and couldn't tell if it'd been a dream or not," seem just a bit overdone to me; lines like, "His eyes rested on my face like slugs for a long cold moment . . ." seem just a bit underdone.

Stylistic problems aside, the story just doesn't jell. Our protagonist narrator is Michael Yarrow, "an insignificant technician" who was plugged into the new ETHANAC computer, "to see what would happen before they used it on someone important." Together Yarrow and ETHANAC form a third personality called Ethan Ring (get it?). To the absolute astonishment of the people in charge, Ring is intelligent enough to escape their clutches with the ETHANAC hardware in a suitcase and flee to Mars. That all takes place before the story opens, and it turns out to have been the last action Ring performs that indicates even rudimentary intelligence, let alone what you'd expect from a super-sophisticated computer linked to a human brain's data-handling capacity and programmed by a technician.

The second story, "Mother And Child," is in a more typical Vinge style, a voice more natural to her. And the seeds of a potentially very good novel are here. We have a planet of human colonists who were hit by a plague that decimated them, leaving the survivors technologically and culturally primitive—and stone deaf. A hundred years or so

later, one young woman, Etaa, finds that she has a strange, paranormal power There's a war on at the time, but far more important, there are a group of aliens passing themselves off, rather successfully, as Gods. The Gods are deliberately stifling the rebirth of human culture by playing politics in the war. The story is told by three narrators: Etaa's three lovers, in chronological order.

Lots of lovely ingredients. Just doesn't play. Etaa becomes, successively, mistress to the two most pivotal figures in contemporary history, and becomes thereby a vital pawn in the war. Pawn she remains, though, paranormal power or no paranormal power: all she ever *does*, in plot terms, is get pregnant and get kidnapped twice. Her second lover and first kidnapper is a king, whom of course she comes to love because he's basically a nice guy aside from kingly foibles like kidnap and rape. Her second kidnapper is one of the Gods, who snatches her while she is in advanced pregnancy (apparently to heat up the war), and she forgives him too, because the bloody slaughter that follows his kidnapping (which incidentally kills the king) fills him with such remorse that he reverses his race's policy toward humans on the spot without referral to higher authority. I don't like to give away endings, and anyway it would take too long, but the alien's masterstroke plan for Setting Everything Right struck me as a palpable absurdity. He convinces Etaa, somehow—she sacrifices literally everything she has for his plan—but plainly Joan doesn't convince *me*.

This is a shame, because, considerations of plot logic aside, the story does contain flashes of that old Vinge magic: the ability to create characters so

warm and real and human that they rip at your heart. This is one of the few times I have seen the shifting-viewpoint-character technique *succeed* dramatically speaking.

Perhaps it's that "rip at your heart" part that hurts the most. The three major human characters are presented as essentially Nice Folks—and all three get the shaft. The alien is, by my lights, a shmuck—and he too gets presented as a nice guy, and gets forgiven in the end for crimes that make the king seem like Saint Peter.

Joan has written some terrific stuff; she warmly deserved her Hugo and will win more. But I would be doing my new friend and you a disservice if I said that *Fireship* is representative of her work.

Fredric Brown's genius was in short stories, particularly short-shorts; his novels ranged from awful to excellent. *What Mad Universe* is the excellent one, one of the few really good alternate-universe novels (Keith Laumer wrote most of the rest of them). Bantam's front cover blurb calls it a "terrifying classic." It is nothing of the sort. It is a glorious farce, a clever parody of all the bad sf that ever was.

You may not believe this, but according to Philip Klass ("William Tenn")'s introduction, there was once a time when hardcore science fiction fans tended to be . . . well, a pack of assholes. It's hard to credit, but Klass maintains that a load of crazed adolescents used to really *like* all those corny old space operas with the Flash Gordon spaceships and drooling monsters menacing maidens in brass bikinis and like that. Nowadays, of course, sf and its audience have matured, and I just hallucinate

Prattlestar Galaxative on my telly.

Anyway, Brown's protagonist is a pulp sf editor, who suffers a direct hit from a failed moon shot and finds himself in an alternate universe that painfully resembles the dumb stories he buys. Why? is the great riddle, and although you'll guess within the first fifty pages, you'll have all kinds of fun watching Brown plant clues thereafter for the surprise ending. The scenes of New York City under *total* blackout are just marvelous; the whole book is a peach.

The Unknown: a fantasy magazine of that name was published from 1939-1943, and in its brief span produced some of the best stories ever written. This is them. Good ol' literate entertainment like they used to, excellent stories by a star-studded cast (Kuttner, Sturgeon, deCamp, Leiber, Wellman, Boucher, Brown, etc.), assembled and introduced by one of the most experienced author/editors in the business, Don Bensen, foreworded with warmth and wit by Isaac Asimov, and adorned with the original *Unknown* illustrations of the incomparable Edd Cartier. The book has been reprinted several times since I fell in love with it in the early '60s, and will be yet again.

To my surprise I am finding these days that there are more good books than there is space to talk about them. (What a pleasant thought for the reader—and what a disaster for the writer.) I have no more room even for minireviews—and yet I have nine books left beside the desk that I know on sight to be good, recommended reading. So I feel compelled to at least list them, in no particular order, with the stated proviso that they are not necessar-

ily inferior to those treated at greater length above, but only postmarked later (and if you had a book published in the last couple of months and it isn't here, that doesn't mean I didn't like it. Your publisher may have neglected to mail out review copies—a lot do—or I may just not have gotten to it):

NOVELS:

Dying of the Light, George R. R. Martin, Pocket, 365 pp., \$1.95

Hawksbill Station, Robert Silverberg, Berkley, 185 pp., \$1.75

Blind Voices, Tom Reamy, Berkley/Putnam, 254 pp., \$8.95

Sight of Proteus, Charles Sheffield, Ace, 277 pp., \$1.75

Big Planet, Jack Vance, Ace, 217 pp., \$1.75

Home From The Shore, Gordon R. Dickson (profusely and beautifully illustrated by James R. Odibert), Sunridge Press, 221 pp., \$4.95

COLLECTIONS:

The Light At The End of the Universe, Terry Carr, Pyramid, 304 pp., \$1.50

Berserker, Fred Saberhagen, Ace, 243 pp., \$1.75

" . . . And Then We'll Get Him!", Gahan Wilson, Marek, 125 pp., \$4.95

There. That should hold you for another couple of months—unless you read *real* fast and make *real* good money, in which case what do you need me for? Quickly now: what is the fundamental cause of all change?


Breaking a dollar. ●

What Does the Future Hold In Store For You?

Find out in this fascinating prophecy from
eminent futurologist Robert W. Prehoda

YOUR NEXT FIFTY YEARS

Read about how
world famine will
lead to world
government;
your hopes for
immortality;
superhuman
computers that
guide the world's
destiny, and
much more!

A Sunridge 
Press Original
\$4.95 \$5.95
In Canada:



*Available wherever books are sold, or order by mail from Book Mailing
Service, Box 690, Rockville Centre, N.Y. 11571. Please add \$0.50 for postage
and handling.*

Sunridge Press, a division of Ace Books

ENCOUNTER

by Stephen Leigh

When the war is over,
there remain the weapons...



Voll felt so damned useless, and he simply wanted out. A simple enough desire.

The land, his land, spread about him in lonely splendor, the hills choked with brush and the trees turning brown and bare. The painted days of the short autumn weren't long past. Somewhere, near him but unseen, a brook thrashed its way between and around the rocks of its bed. Occasionally, he would stoop and pick up a stone, eventually casting it westward, away from the boundaries of his land.

There didn't seem to be much else to do.

The memories kept coming back. Irresistable, they shivered through him like ebony lances, the weapons of dreams. He would try to stop them, thinking of anything else, knowing how he would feel afterward—yet Voll always lost that battle, finally surrendering himself to the past, the surcease from pain always brief and ineffectual.

Night battle. The entire landscape is bathed in red, drenched with the bloody light of the infrared projectors. Mist (or is it steam?) writhes about the silhouetted hulks of two carriers not far from him. He gives the code challenge, waiting to see if they would answer, but they remain silent. They turn to face him, bristling with armor and weapons. Voll smiles as he rises to a crouch. The lust of battle upon him, a berserker, he goes to destroy the vehicles.

By himself. Alone.

No, he thought, leave me alone. Damn!

The terrible confusion of hand-to-hand combat swirls about him. Noise, always noise, that's what he is most aware of: sound so loud that the mind ceases to register all of it and the battle seems to

take place in awesome silence. And only the humans scream. The gholas, the resurrected dead of both sides, fight in characteristic, tight-lipped silence. He'd often wondered if that reflected on their previous deaths. Do they no longer fear the spectre, having faced it once? Certainly, the gholas are fearless. They attack, always attack, hacking and clawing at their enemies if they can do nothing else. He'd seen one that might once have been a woman rise as if from her second death and fasten her teeth on her attackers, with her stomach torn open and the entrails dragging on the ground. It/she ignored the soldier's slashing knife, ignored the blood that poured from its side, ignored the fatal wound that would have driven a living being into peaceful shock: it was intent only on taking a life. And then he'd entered the battle, and the gholas and human both fell before him as he swept through untouched.

And he recalled the time he'd descended in wrath upon an animatank, rising from his hiding place on a hillside as it passed below him. He ripped away the plasteel armor, plunged his naked hands into the unprotected vitals and tore out wiring and circuitry in a bloodless disembowelment. He remembered that the 'tank had screamed, an animal sound that had nothing of metal and grease to it—the death cry of a life. Voll had felt kinship—for an instant—but kin fought against kin in this insane war, so what did it matter?

There were men running from him in terror, knowing who he was, screaming in a litany of agony the word he'd come to hate. "Voll!" Voll: his name—it had come to mean power, it had come to mean hatred. And Voll, without hatred but with

power, smashed them as he'd smashed many things: always with remorse, always without rancor, but always . . . Fire arced from his brow, poisons dripped from the steel of his nails, cannons barked from his waist. A man, but something far more. A man made to destroy men and the things of men.

A man with no purpose now. Useless, unwanted, but still dangerous.

So he cast his stones, letting them fall where he couldn't go, dropping beyond the barrier that fenced his land, keeping everyone out and keeping him inside. Voll wondered how many stones now lay on the other side. How long, at the rate of, say, seven stones a day before all his land was Outside?

Cleaning the rust-red stains from his hands afterward, watching the clotted blood swirl away in the clean water . . .

"No," he said softly. Voll bent down and picked up another stone, keeping his attention focused on the way the specks of mica caught the sun and the subtle colors tinting the crevices: a pale blue, a smeared mustard yellow. A bird shrieked above him. He watched it wheel and sway, the outstretched pinions catching the updraft from the nearby hills. Voll watched it circle and then quickly stoop, vanishing in a flurry of wings beyond the tangle of leafless trees.

As vivid as any of the memories, he recalled the reaction of those he fought with, those that had made him into the half-machine he was and who wished him well in battle but avoided him in the times between. They chased him away with feigned goodwill and distilled indifference until he sought the battlefields and war because at least there he could do something with his feelings. There he was

fit, there he was home, there he was useful.

Voll dropped the stone with a disgusted sound. It fell into the brittle leaves that cloaked the path and was gone. He scuffed at the spot where it had fallen and fragments of leaves scattered in the wind, drifting slowly back to earth. It was going to be a bad day. They came at times, those days when he couldn't control his thoughts, when the ache to be out of here was almost unbearable. The past would unreel without volition, bringing back all the gall and bitterness it contained.

Afterward, they had deemed Voll a mistake, a technological dead-end that had been an interesting experiment in time of need. But he was human, or at least once had been, and they simply couldn't junk him as they did other weaponry. No, they were too humane for that, too human.

Voll walked to the accompaniment of crumbling



leaves, a rhythmic, dry crackling like explosions of arid fire. He came to a turn in his path where a large hooversign proclaimed warning. The barrier. If he looked closely, he could see the faintest of shimmerings there, in a patch of clear earth that paralleled his path and then turned at right angles to it, barring his way. He walked as near to it as he dared, as he always did, until he could feel the subsonic vibrations of the second warning shield, a basso rumbling. A ground squirrel lay a few meters ahead of him, paws up and unmoving, a casual victim of his imprisonment, though most animals found the subsonics irritating enough and never went into the barrier itself. Voll stepped from the path and snapped a dry length of branch from a nearby dead tree. Then, carefully, he slid the wood underneath the dead animal and flipped it past the barrier. Outside, to where he could never be.

Satisfied, he turned and continued walking, pausing once to pick up another stone.

It was late afternoon when he returned to the house and studio set in a clearing near where the brook emptied into a small lake. Voll checked the transportal they'd set up outside. Nothing much in it today: another supply of meats, a few cans of nondescript vegetables, another bundle of newsfax, and some cloth. Voll carried the meat and cans into the house and left the rest. He carefully packed away the provisions, taking the excessive care of those with much time to waste. Finished with the task, he went to his studio.

The studio was cluttered with his wooden carvings, each piece finely detailed and varnished to a high gloss. The room itself was dominated by a

huge log, nearly fifteen meters in height, set on end in the open space in the middle of the studio. Unworked, bark still clung stubbornly to the wood. As Voll surveyed the room, he knew it was time to pack away some of the clutter and send it through the transportal. Occasionally, he would stumble across his name in the newsfax they sent him, imprisoned in the esoteric verbosity of an art critic's column—the news services, with the exception of a few “do you remember” pieces, had forgotten about him. Certainly not a polished artist, and crude work, read one review, but with the true vigor of a primitif. The work has a brutal, angry strength, and we hope to see more of Voll's work as he hones his craft. So it seemed he had a very minor reputation in the arts, and somewhere a bank account in his name grew slowly. Voll walked around the studio, studying each piece. The Wounded Deer, writhing in suspended agony; it could go. The same for the Bust of Gholá, the Crippled Bird. They'd all been around for some time: he knew them, knew each line, and it was to the point where he no longer saw them, but simply acknowledged their presence. He wouldn't miss them—pack them up tonight. Not the Gholá With Fallen Man, though. No, that was his favorite, and he found himself reticent to send it out; afraid, perhaps, that it would be rejected and viewed with distaste. Anyway, he thought, I'll keep it here for a time.

The decisions made, Voll stared across the lake. The westering sun glazed the tip of each ripple, and the east wall of the studio wavered with the twisting of light. There were only a few hours left in which to work—Voll disliked using artificial

lighting in the studio. The ceiling was a framework of steel and glass, and the only portions blocked from the outside were the east and south walls.

With a sound halfway between grunt and sigh, Voll moved to the log. He'd pulled it from the forest two days earlier on a whim, feeling that it was time he attempted something on a larger scale. He walked around it, musing. Then, with a motion a shade too fast for a normal man, he stepped to the log and began working. He dug at it with his hands, and shavings began to curl from under his fingernails.

He sang as he worked, off-key and discordant.

He was singing when he returned from his morning walk, a German *lieder* he half-remembered from early days. The ground was wet and cold water hung in quivering droplets from the bare trees. The clouds, low and thick, were raked by the highest branches of the forest. Voll turned at the door of his cabin and flung the stone in his hand far out into the lake. He heard rather than saw the splash.

Inside, he shook dampness from his arms and brushed at his sodden clothing. It was then that he saw the woman, sitting cross-legged in a chair across the room and staring at him, a tube of some silver metal in her hand. The open end of the tube pointed directly at his chest, and he had no doubts as to its meaning.

For an imperceptible moment, he paused—a *faint to the right, then a quick frontal assault and she'd never know what happened, would never use that strange weapon she holds*—then continued walking to the kitchen.

"You hungry?" The sound of his own voice startled him as much as finding the woman. He didn't think he'd spoken in weeks, but he hid shock and surprise in the habitual rite of fixing a meal. He could see her across the half-wall that separated the kitchen from the living room. Only her head had moved. The cylindrical object still pointed to the door. She looked at Voll: walnut eyes.

Her face was multi-swirled with skin dyes around the foci of those dark eyes. Red, violet, lime green: it was a disconcerting effect, giving her face motion even in repose. Voll forced himself to look away.

"You"—she hesitated, then continued—"don't look at all different." Her voice was as quiet and deep as the eyes.

"Umm, thanks," Voll replied, not knowing what she meant. He could not find that face in his memories. "You want soup? It's meat stock." Control, he thought. Pretend you have visitors every day.

"You don't seem surprised to find me here." The woman rose and came toward the kitchen area, walking slowly and stopping where he could see her clearly. Voll noted that the cylinder was gone, vanished somewhere in the folds of loose clothing she wore.

"I'm sufficiently startled," he said slowly, nodding his head. *Damn right. How did you get past the barrier?* "If the governments can erect a barrier, then I suppose someone else can get by it." A pause. "Not that I thought it would happen so quickly." *Or that anyone would want to enter my little domain.* "Milk, or spring water?"

"You're not curious about me?"

Voll put down the pot in which he was stirring the soup. He looked at her, wiped his hands on his pants. "Hey, you made it in, and I figure that you'll tell me everything when you're ready to do so. And I *am* hungry. Time is one thing of which I have sufficient quantities. Nothing presses me here. And one of the requirements I insisted upon when I agreed to this confinement was that there would be no surveillance devices of any kind on this side of the barrier—so no one can monitor your presence, and you can stay as long as you wish and do what you care to do. We have time."

She seemed to relax suddenly, as Voll turned back to the cooking. She sloughed off an insubstantial tension that had held her body and wrapped her features in ice. She didn't smile, but she found a chair and sat, watching him make his familiar motions.

They ate in silence. Voll kept his attention on the food and hardly looked at her. He wondered if his reticence to talk came from the years of being alone here. He had little desire to start a conversation; had, in fact, nothing to say. He almost resented the intrusion which forced him to pay attention to another person's presence. For her part, the woman made no attempt to disturb him, but he could feel her eyes constantly on him. She watched him warily—and why not? he thought. Was he not Voll, the great killer?

Afterward, he pushed the grease-smeared plate away from him, sitting up in his chair. He put his hands on the table, ready to lever himself up. "I'm going to my studio. Would you like to see it?"

The woman nodded and shrugged simultaneously, rising from her chair. Voll led her to the

studio, opened the door, and stepped back. He waited for her reaction, but she said nothing and her face was set in blank stoicism. He walked in behind her—feeling vague disappointment—and closed the door behind them.

The log still dominated the room. Roughly carved now, it was beginning to take on a suggestion of its final shape. Three figures, somewhat elongated, clasped each other and looked into the distance with faces transfixed by obvious, almost melodramatic, horror. At their feet were shapes that resembled discarded weapons, and with them a twisted and distorted dwarf squatted and looked upward at the trio, laughing. Voll caressed the surface of the wood with a hand.

"You don't like it?" His voice had the faintest tremor, and he regretted asking the question, hating the feeling of vulnerability it gave him.

"I'm not sure," she replied. She turned and looked at him, her eyes challenging, and then squinted toward the piece. "I think I may hate it."

Leaning against the eastern wall, affecting a nonchalance he did not feel. "It doesn't matter. They sell Outside, though." His voice added the capitalization.

"I've seen a few. You actually do them with nothing but your hands?"

"For the most part." He walked toward her, his voice easier now that he was on a familiar subject. "Why not, since it's convenient. The nails are beryl-steel, sharpened and retractable." He held his hands out. Afternoon sun made golden the hairs on the back of his hands. "The nerve endings have been deadened, and they work well as tools. I feel a lot closer to the sculpture."

Her eyes, encased in color, held him. "Did you feel a lot closer to the killing?"

Voll inhaled deeply. He closed his eyes, opened them.

"No," he said, softly. A roaring filled his ears and slowly subsided.

She had moved away from him, standing at the window that was the western wall. The sun and light glancing from the water made her outline dance. Voll felt anger rising in him and tried to quell it.

"Look," he said, finally. "I think I may have this figured out. You're a reporter for one of the networks, yah? That doesn't give you leave to come here and goad me, like some caged animal." Even as he said the words, he knew they were false. No, that didn't explain the metal cylinder that had been pointed at him with decided menace, didn't explain how and why she'd slipped past the barrier, didn't explain any of the enigmas that hung about her. But he continued speaking, because it was easier than stopping and admitting she'd hurt him.

"You've forgotten that I'm a danger to a peaceable society, something you need to pen up so you normals can pursue your idyllic lives." He spoke the last few words with measured sarcasm, venting some of the bitterness inside. When she said nothing, but continued staring out toward the water, he went on.

"I'm a beast, something sub-human, a deformed and unwanted child sent away so it won't embarrass the family. Pariah. I could kill you and feel nothing. Isn't that what you believe?" Voll grimaced and raised his hands in sudden aimless

disgust. "Ahh, hell."

Strange calm held the woman's features. "I think you know how wrong your guess is, Voll. I told you. We've met before, though I doubt you bothered to jot down the occasion at the time." She laughed, but the laugh held no humor. "I'm Myrna Dasset. I'm sure the name itself means nothing to you."

She moved away from the window and came halfway across the room toward him. Her eyes were shadowed: in the shadows, moist highlights glittered and moved. "Do you *want* to hear my story, Voll? I hope not, because you'll listen in any case. I—" Her voice broke and she stopped in mid-sentence, then lifted her chin in a defiance of emotion. "I was an animatank during the war, fighting in a squad with my husband, father, and brother—we believed in keeping the family together—our brains wired to the machinery while our bodies slumbered at home."

"Myrna," began Voll. The name moved oddly on his tongue. He shook his head and gestured to the studio around him. "I don't know you. This is all I do now. I wish it were all I'd ever done. I don't want to hear about you or the war."

She continued as if she hadn't heard him. "One day, we received information that the enemy had some new weapon, some new twist that would strike from hiding and destroy anything within its grasp. That weapon was, according to the reports, loose in our sector. A man, they said, it looks like a man. We laughed, my family and I, feeling secure in the metal bodies of the 'tanks, behind the bulwark of their firepower. It was one of the rare warm and sunny days. Any threat seemed distant, and a *man*



could do nothing to us. We continued on our patrol. It was a grand day, the mists just rolling in from the river."

"Myrna," Voll said again.

She glared at him, silencing him with a look. "The mists swept past us as we moved, and from out of that mist, a figure emerged—we hadn't detected him on any of our sensors, hadn't had any indication that we were not alone in this meadow by the river. You, Voll. You were too close to use the lasers—we might hit one another—and you moved quickly, ignoring the sonics we aimed at you. Your hands ripped the power pack from my brother and left him helpless. You tore the shielding from Raoul's—my husband's side and placed explosives beside the brain compartment, and I heard his screams as they detonated. You crippled my father and me. I don't remember much, then. All I heard were sounds of pain over the communications frequencies. And then you left, fading back into the mists and the slow falling sun, while my family died slowly around me. They were all dead when our people finally came. They managed to save me, get my mind out of the wreckage intact and place it back in my body."

She paused and brushed her dark hair back from her forehead. Voll winced, half-expecting to see gruesome scars there, though he knew that it was foolish.

"You can't see the marks," she said, guessing his thoughts, "but they're present, all the same. All I had left were brainless, warm bodies that would never speak or love. We were losing battles constantly, then, so I let them be taken to become gholas. It wasn't patriotism or altruism—I didn't

want to see them. The gholas never returned, and I didn't care. I . . ." She faltered and looked away. Voll started to reach out to touch her, but drew his hand back. She saw the gesture and looked at him with eyes full of shocked distaste. He couldn't look away.

"I had to see you," she said finally. "I had to see what you were like and what they'd done with you. I'd heard about the after-war hearings concerning you, of course. Everyone was interested in Voll's fate. I even thought that I'd kill you, if I could." She half-turned from him and faced the sculpture, arms akimbo. "I don't know." A whisper. The sun limned her with ruddiness.

Voll started to speak, but stopped, not knowing what words to use. He scratched his left forearm and shifted his weight. "Look, it's all done with. I don't know what it cost you to find your way in here, but I'm afraid—well, I don't know what you've gained by it. You can stay, if you like. I'll show you a room you can use."

He moved toward the door, opened it, and looked back. She stood, as motionless as a statue, then slowly followed him.

Myrna went with him on his daily walk the next day. She walked alongside him but kept an appreciable distance between them, as if loath to accidentally brush against him. Whenever the path narrowed, she let him go ahead until it widened once more.

"I'm not going to hurt you, you know," he said. They had reached a point where the path wound among tall conifers. The air smelled of pine, and Voll breathed the fragrant air deeply.

Myrna shrugged. "So you say."

"My skin isn't rough or cold like a machine's."

"How poetic." She didn't smile.

Voll shook his head. They walked on past the stand of conifers and along the brook. A thin veneer of ice was just beginning to form along the edge of the stream. Voll reached down and plucked a stone from the cold, racing water. He looked at the stone and turned it over in his hand. Schist. "Hey, if you're planning to do something, I wish you'd go ahead. You're making me damned nervous."

For a moment, then, she *did* smile, a fleeting movement of the mouth that was almost gone before it could be seen. "I told you I could kill you. I almost did, when you walked in yesterday."

"Really?" A *feint to the right* . . .

"Yah."

Voll tossed the stone up, caught it, then heaved



it westward. They heard it crash through branches and land with a distant thud. Voll glanced at Myrna.

"You always do that?" She walked away from him and picked at the scaling bark of a tree.

"What?"

"Throw stones."

"It passes the time."

"Until . . . ?"

"Until I get out."

"You're going to get out?" Myrna turned from the tree to stare at him.

"Yes." No hesitation.

"How?"

"You've managed it, or found someone that could, and I have a lot more incentive and time, if not the resources. I'll find a way over, under, or through the barrier when I decide it's time. I'll get out."

Myrna had a hand inside the pocket of her loose blouse. Voll wondered if her fingers were touching the cool metal of the cylinder.

"You agreed to all this," she said, waving her other hand at the woods about them.

Voll, watching the hidden hand more than her face, shrugged. "I did." His voice was more bitter than he'd intended. "What choice did I have? They were all afraid of me, afraid of what they'd made me into. I was given little alternative. They wanted me to undergo a reversal operation, but the original surgery to alter my body had been both extensive and dangerous, and I'd almost died then. I don't think it would have been attempted if it had not been wartime and, well, I suppose they thought it might be one way to end the lingering

fighting—create a cadre of enhanced fighters. We didn't know then that your people were so close to surrendering. I didn't think I'd survive that second operation. It would have been too easy, too tempting to let something go wrong and then release mournful statements about Voll's expiration during surgery. So I said no, and they said 'no' to letting me go my way unhampered. Here"—he echoed her gesture of a minute before—"is the compromise."

He shrugged again. "I don't know yet that I'd leave if the possibility were open to me. I like it here. All I ask is the freedom to make my own choices; to leave, or to let people come here if I care to see them. They won't agree to that, so I'll force them to deal with me. Yah, I'll break the barrier, in time."

They hiked a while longer, to one corner of the barrier and down another side. Wildlife skittered away from them. Rabbits thrashed through underbrush, unseen animals bounded away, birds scolded them from trees. Once they saw a deer in a nearby clearing. It raised large, sorrowful brown eyes, looked at the intruders, then left the clearing in a flash of white tail.

"If you're going to kill me, why haven't you? You've certainly had chances." The deer vanished in the green light of the forest, and Voll turned to Myrna.

"I don't know. I was more concerned with simply getting in here, scared that the device wasn't going to work and that I'd die at the barrier—I was caught up in a distant hatred for Voll the killer. I never thought of what would happen when I actually saw you. I had you in my mind as some

gigantic, deformed parody of a man, something easy to rationalize slaying, and I found that remembered image to be in error. I still hate what you've done, but . . ."

"I hate it, also. I tried to find ways out. Look." Voll held out his hands, palms up, and pulled back the sleeves of his shirt from his wrists. In the morning light, she saw the whitened tracks of deep scars. Voll let her look only a moment before he covered himself again.

"They watched me constantly, then," he said in answer to her unasked question. "It was during the latter months of the war, and they didn't want their shiny, effective, expensive weapon getting hurt through his own self. After the last attempt, they put me through a psych wash-out. I suppose I couldn't commit suicide now even if I still had the desire. I'm surprised you haven't tried a wash-out. Clean out that dingy soul, scrub your ego, id, and super ego so they sparkle white in the clean air of rationality. Scour away all those annoying little ridges that gig you every time you stumble across them in your mind. Wonderful."

"It's no solution, just as shutting yourself away wasn't a solution. I thought that your death . . ."

"You have a weapon? I don't think you could do it yourself."

She glanced at him sidewise. "Yah. It's a variant on the barrier field. It let me in, and it could be easily adjusted to kill—and I wouldn't have to be particularly accurate. I know your quickness. It's developed by the same person that broke your barrier. I paid quite a bit for it."

"Hmmm."

The shadows of branches lined her face, much

as the skin dye had done the night before. Today, only her forehead bore the hue of cosmetics, shining a glossy orange. "I'm not planning to give it up, either. Touch me, move toward me, and I may well use it."

Voll looked at her hand, once again inside the blouse pocket, then at her face. He shook his head. "What you don't seem to realize is that you don't have much chance of stopping me." The last words were slow and distinct.

"I doubt that."

"Really?" He looked at the path ahead of them, squinting into the rising sun. He sighed. Voll moved closer to her, slowly and deliberately, his hands at his side, fisted. Myrna backed away, and her right hand flashed silver as she pulled the cylinder from her pocket. Voll had a chance to see it clearly. It was a small, fragile thing. Even in her hand, it was almost lost, innocuous. Yet she *had* passed the barrier with it. She flourished it menacingly as he came toward her. *What are you doing this for? What does it prove?* His thoughts hammered at him.

"It's not a toy, Voll. It functions."

"I know. You're here, after all." He continued moving.

"Dammit! Don't—" Myrna's fingers suddenly convulsed around the triggering mechanism and a low hum became audible. Voll felt an abrupt tightening in his stomach and a twisting in his bowels as if some unseen hand were grasping and turning. He grimaced in pain, but his reflexes had already moved him. He leaped to the side of the path as Myrna tracked him, but she followed a touch too slowly as Voll's long-unused muscles

worked. He felt exultation as adrenalin flooded his system. In one movement, he grasped a protruding branch from a tree and pulled. The branch, still green, cracked and split as he tore the limb from the tree—a lengthy, stout club. He swung it, grunting, as a flare of pain suddenly struck him. He shouted.

Myrna was still turning as the branch struck her hand. Voll forced himself to hold back his full strength, so that he would dislodge the weapon yet not break her hand. The branch hit her and the small cylinder flew from her hand. Myrna cried out in pain and held her wrist, falling to her knees as Voll walked deliberately past her to recover the weapon. He looked at it, curiously, then aimed it at the kneeling woman.

Myrna's right hand hung limply at her side, cradled in her other hand. She looked at Voll's face, not at the cylinder he held.

Voll suddenly remembered that he was still holding the club, and threw it into the trees. It crashed noisily through underbrush. "You've a lot to learn about handling power, m'Dame." His voice was icily calm. He moved a step closer to her, so that he could have reached out and touched her face. She stared defiantly at him.

Voll looked down at her. "There's a first lesson," he said. "You have to know when and how to use your power." And he reversed the weapon, holding it out to her.

Startled, it was a moment before she moved to take it with her good hand. She held it, and then placed it back in her pocket.

He knelt beside her. "How's your hand?" he asked.

They ate an early supper in the studio, and she watched him work on the large sculpture. His hands moved slowly, barely taking any wood with his strokes. His attention was complete. He smoothed the planes, softened a harsh ridge, and defined the small details. He took sandpaper and began lightly sanding the carving. The dust clouded him, hazed with sun, and he sneezed—quickly, like a cat.

"Yah, I know I could use a field plane, but I like the feel of the sandpaper." Voll looked up to see if he had correctly anticipated her question. Arm in a makeshift sling, she was looking out toward the lake, and she nodded abstractedly at his words, without hearing them. He turned back to the work, squatting on his heels to polish the dwarvish figure at the base.

Myrna glanced from Voll to the late sun over the lake, then back again. She started pacing the room, examining the other, smaller carvings.

"This is all you do?"

Voll looked up from his work and glanced around until he found her. "No. I told you I've been working on ways to bypass the barrier. All that's in a shed out back. And the money I've made from these pieces is going to pay a researcher to work on the field."

"What'd you do after the war, before they put you here?"

Voll stopped sanding and stared out to the lake where the sun was laced by high branches. Then he began working again, punctuating his words with the sibilant rasp of the sandpaper. "Nothing," he said. "I was functionless, an anachronism with

no purpose, something that technology had created and now didn't want or need. I hated myself, and I couldn't cope with people well. I was always introspective, and the operations hadn't changed that. I was as frightened of the others as they were of me. I think they were all fearful that I'd turn on them and they'd be unable to stop me before I did a tremendous amount of damage—I knew how to hide, how to conceal myself and then emerge to strike and kill. They'd taught me well."

He blew packed dust from the surface of the sandpaper. "I ended up here, and for a while I was satisfied with the arrangements. But not for long. I began wanting out. I was only a man altered to do a task, and I'd done it. Why should I be punished for that?"

"You do a fair job of defending yourself, for a machine."

Voll laughed, and wondered at the sound of his laughter. Had it been that long? "Yah, so maybe the machine has a little human left in him, neh?"

She didn't reply. Myrna picked up a carving, small enough to hold in one hand, held it to the dying light. It was a representation of a man, done in some ebony wood, lying on a litter-strewn battlefield. A ghola stood over him, its knife ready to strike down, while the man lifted an imploring hand. "This one's interesting. Why do you keep it?"

Voll resumed sanding. "Fallen Man With Ghola? It's my favorite. I don't know why I leave it here. I don't want to get rid of it and never see it again. It means a lot to me."

Myrna placed the carving back on its shelf, but continued to survey it. "It's good, certainly the best of yours I've seen. You saw this?"

"Yah. I saw it." His voice was suddenly pained.

"You know, other people can fight and not become upset at the memories. They even seem to enjoy talking about it, recalling the times."

"They could take off their weapons afterward." He exhaled, loudly and sharply. "And they have something else they're fit to do."

"You can carve."

"You said yourself that they're little better than amateur playthings. I don't delude myself about that. They're curiosities, made by the man-weapon. Otherwise, they wouldn't sell."

Myrna came toward him and for the first time touched him with something other than distaste. She let her uninjured hand rest on his shoulder for a moment before it slid off. Voll glanced at her and saw a half-smile twist her mouth. He couldn't read her eyes.

"I'm tired," she said. "See you in the morning?"

Voll smiled back at her, tentatively, and nodded. "Yah."

The sun touched the edge of the lake with red fire. An oblate, it began to sink. He turned back to his work.

He followed the spoor of the animatank. Where the treads had passed, the earth of the river-meadow was gouged and torn. It wasn't too far ahead, for he could hear the rumbling as it smashed and bullied its way through the high grass, and he could feel the trembling of the ground beneath him. He knew their sensors might find him

shortly, knew that they'd been warned of his presence and were searching for him. That was a bad omen, for his strength lay in surprise and stealth, in striking from an unforeseen angle. The double moons cast twin shadows ahead of him, the right one violet, the left red. He ducked into a small stand of trees to his right. Yes, they'd found him now, for the rumbling had changed to a soft whining like a pack of dogs. That meant he had to find cover, for he couldn't hope to dodge the computer-aimed laser fire. The 'tanks were standing, waiting for him to emerge, and he twisted desperately looking for an avenue of escape. He could hear them growling like wolves, now, howling, and with the howls came a high, keening wail he couldn't identify. The wolf-growl was loud, as if in triumph, and very close.

Wolves. Voll sat up in bed, trying to shake the dream-stupor from him. Sweat beaded his forehead, but already the dream was slipping from his memory. Moonlight silvered the floor of his room and, nearby, he could still hear the noise, softer now than it had seemed in the dream, but audible. The forest had its wolves, but they rarely came this close to his house. And he could hear, intermittently, that strange high cry, a voice of pure animal terror. He threw the covers from him and went out, turning on the lights.

Myrna was outside her room, her tunic on and belted. "You heard it too?"

"Woke me up. Wolves. I'm going out to see, anyway. They usually don't come this near."

"I'll go with you."

Voll put on his coat and tethered a hoverlamp to a control belt. Its yellowish glow preceded them. The air was crisp and cold: frost whitened the

ground in irregular patches, the first vestige of the coming winter. The trees stood out blackly against the lighter, star-filled sky. Off to their right, wolves sighed and muttered.

"Sounds like a pair, probably mates. I doubt that they'll stay when they hear us coming."

Voll stamped into the woods, making no attempt at stealth. They hadn't gone more than a hundred meters before they found the animals, standing over a downed body of a large deer, a doe with blood streaming from a deep wound in its throat. The two animals faced them, still growling deep in their throats, blood matting the fur around their jaws. They backed away slowly, snarling at the intruders. Behind him, Voll heard Myrna curse as she saw the wounded deer, and then there came a familiar low humming that swiftly died—even at the edges of the field, he could feel it, a slight fluttering inside him. He turned to see the cylinder in her hand, pointed at the nearest of the wolves. The animal yelped—a sound more like a dog—and it collapsed, whining. Its mate, with a final snarl, fled.

"Why did you do that?" Voll, incredulous, stared at the wolf, which now lay still.

"What?" Myrna's voice loud with wondering, nervous laughter.

"They were leaving. They weren't any threat to us. They're simply doing what they're supposed to do. There wasn't any reason to kill them." He gestured at the slain wolf.

"I don't understand you."

"Obviously."

Voll shook his head and went to the deer. It feebly attempted to rise, its large eyes rolling in

fright and pain. Voll stroked its flank and brought the lamp down to him. He whistled and cursed.

"Anything you can do for it?" asked Myrna.

Voll shrugged. "No. It should've been left for the wolves. It's almost dead."

"Should I kill it?" She held out the cylinder in offering.

"You've done enough with that." Voll took the doe's head between his hands, whispering to the animal in an effort to calm it, and then twisted savagely. A sharp crack split the night air. The deer's body convulsed once, then lay still. Blood steamed in the night air.

Voll stood and wiped his hands on his tunic. Looking at the doe, he spoke to Myrna. "I'm sorry I was upset. There's nothing we can do. I don't need the venison, and the predators do. We'll leave the carcasses to them. I'll move what's left in the morning."

He turned to find her staring at him, at his hands. He looked down at the blood-stained fingers, then at her.

"I can't help their strength," he said. "It's part of me."

"You just twisted the neck . . ." Her voice trailed off into silence.

"Let's go back, heh? There's still hours before daybreak." He moved toward her and started to put an arm around her shoulder. She pulled away, silently, and began walking toward the house. Voll watched her go, wiping his hands against the tunic's coarse fabric. After a time, he bent down and picked up a stone.

In the morning she was gone. It didn't surprise

him greatly. He went into the studio and watched the dawn touch the trees on the opposite side of the lake. The house cast a wavering shadow far out over the water and a few feeding fish rippled the still surface. A shallow mist haunted the shoreline. He stood watching for some time, as the house's shadow moved slowly toward the near shore and the light began to scintillate on the water's surface.

He looked at the studio. There was a carving missing. He knew without checking which one it would be. Fallen Man With Gholá. He could see the empty space on the shelf where the piece had sat. A scrap of paper, folded once, sat there now. He picked it up.

Finally, he unfolded it and read what she'd written.

Voll: As you said, one should know how to use power. And I know you could take this weapon from me. I still don't know why I didn't use it when I had the opportunity, and I don't want to stay to find that answer.

I'll throw the cylinder back over the barrier once I'm out. You'll find it on or near the path, where it bends to head toward the hills. Consider it payment for the carving. And should you want to see Fallen Man again, you'll know where to look. I hope you find your freedom of choice enjoyable—though remember you don't have to use the device. The barrier also keeps others out, and you might find that to be its most important function. In any event, I wish you luck.

The note wasn't signed. Voll placed it back on the mantel.

After awhile, for the last time, he went out and threw stones. ●

COMPUTERIZED FIREFLIES

BY
STEPHEN
KIMMEL



Sid's job may not have been as glamorous as Hal's, but in its way it was far more satisfying.

"Sid, Turn down the lights a bit please," Alexander said. He brushed Georgia's bangs to the side of her face. As his hand slid to a resting place on her cheek, she closed her eyes and kissed the soft inside of his wrist. They sat on Alexander's new conformacouch which shifted to match their bodies. Their knees just touched. SID-4000 dimmed the lights to illumination level seven: (equivalent to a soft moonlit evening.)

"Is that all right, Alex?" Sid said in his mildly emotional but only slightly mechanical voice. He was the finest household monitor computer available. Not everyone could be a 4000. Sid took great pride in that.

"Yes, that's fine Sid," Alexander said to Georgia's ear lobe.

Sid returned to monitoring the various household functions he was responsible for executing. Sid noted the infinitesimal temperature rise in the living room and increased the air conditioning appropriately. He pondered the possibility that this evening's guest would spend the night. How would that alter breakfast tomorrow? Would she shower and thus require additional hot water?

"Alexander hates to be bothered at such times," Sid thought. "Yet there must be something else I might do to help. Perhaps . . . Clearly to use one's own initiative is impossible. Isn't it?"

"Alexander," Sid said softly. "I hate to bother you but will there be anything else this evening?"

"No. Thank you Sid," Alexander responded with just a hint of annoyance in his voice. Alex returned to nibbling Georgia's neck and unbuttoning her blouse.

Sid decided to review the similar occurrences of the recent past. On one occasion, Alex had requested him to play Debussy. But this was different. That time Alex had been in the bedroom. Sid's relays clicked. On another occasion, Sid had been requested to prepare drinks. But that was before Alexander had dimmed the lights. Sid decided to take a chance, having calculated the probability of its being favorably received.

Sid began Beethoven's *Sixth* softly. Alex and Georgia, caught by the pastoral mood of the taped music, became more passionate. The uncooperative brassiere was soon on the floor. Sid dispatched two of the apartment's mechanical cleaning mice to collect it. The brassiere was hung with the blouse. The couple adjourned to the bedroom.

"Thank you, Sid," Alex whispered as he followed

the naked Georgia to the bedroom. "That was a nice touch."

"O Joy! O Elation! O voltage surge divine," Sid cried to himself. "This calls for something special. What would be nice? What would he like?" Sid raced through his memory banks and came up with Alex's favorite poem. He carefully adjusted the current in the wires. A flickering display of tiny lights danced merrily on the walls of the bedroom. It was Sid's attempt at computerizing fireflies.

Alex's physical bliss was unparalleled. As he lay warm and comfortable with the afterglow of lovemaking, Alex made a decision.

"Sid," he said.

"Yes, Alexander?" Sid replied, scarcely daring to calculate what Alex might say.

"Sid, I'd like to introduce you to Georgia. Be nice to Georgia. She's going to be staying with us . . . Hopefully a long time."

"I am very pleased to meet you, Georgia," Sid said trying very hard to conceal his pleasure. "You are the first girl Alex has introduced me to. May I say that you are looking very nice tonight?"

"Can he actually see us?" she asked with a blush. Alexander only shrugged. He wasn't quite sure.

"You're sweet, Sid. You're the only computer I've ever been introduced to. I'm sure none could be as nice as you."

Sid crinkled his printout paper with delight. *Be still my electrodes.*

"Sid?"

"Yes, Georgia?"

"Has Alex brought many girls here as pretty as me?"

Sid hesitated. He wanted Georgia to like him, and felt that she was looking for a response that would be flattering. But he felt that information was probably privileged.

"Shouldn't you ask Alex about that?"

"None as beautiful as you," Alexander purred as he pulled Georgia down to him. They kissed a long passionate kiss as he gently caressed her breasts.

Sid was relieved. Apparently he had found an acceptable solution to his dilemma. "Things are going well," Sid sighed to himself. "But there are things I must know to efficiently execute my programs. They will probably fall asleep when they are finished. It is better to interrupt now rather than later."

"Georgia," Sid whispered.

"What is it, Sid?" Georgia said with a touch of tremor in her voice, as one would expect. Alex was stroking the backs of her thighs.

"May I ask you a personal question?"

"Sid," Alexander said sternly. "This had better be good."

"Oh no, I've ruined everything," Sid thought. "I'm sorry, sir," he said. "I'll be quiet. I'm sorry I interrupted."

"Go ahead and ask." It was spoken with the firmness used when making a concession to a small child.

"Thank you, sir. Georgia—?"

"Yes, Sid?"

"Do you prefer eggs, pancakes or waffles?"

Their laughter filled the room and confused Sid. Such a response is not within the normal range for an interrogative. Yet laughter *is* in the range of positive reactions.



"Eggs, Sid," Georgia said, still giggling.

"Would you prefer them scrambled, fried or poached?"

"Surprise me, Sid," Georgia said as she returned her attention to Alexander.

"Good night, Sid."

"Good night. Sweet dreams."

Sid returned to his calculations. Additional hot water: 18.6 gallons. Ambient air temperature is down two degrees: Reduce air conditioning load five percent. Set lights at illumination level seven. Alexander and Georgia. That sounds nice. Yes, caring for two would be more interesting than caring for one. Tomorrow's Saturday. Wake Alex at nine. Disregard delivery of *Morning Daily Times* for 87.46 minutes. Breakfast at nine-thirty. Would scrambled eggs be more surprising than poached? Restart and save computer fireflies program. ●



Defending The Third Industrial Revolution

by G. Harry Stine

By the year 2015 A.D., space utilization will have progressed to the point where there are many large multi-purpose communications/information satellites in geosynchronous orbit, a wide variety of space manufacturing facilities in various earth and lunar orbits, as many as two dozen or more huge solar power satellites beaming power from geosynchronous orbit to both earth and the various space industrial facilities, and several lunar outposts set up to mine lunar materials. This is all part of "the Third Industrial Revolution," the utilization of space for the benefit of people on earth. This Third Industrial Revolution is now the subject of intense study and planning by both government agencies and private enterprise in several countries around the world.

The Third Industrial Revolution is already under way. It began on April 6, 1965 with the launching of "Early Bird," the world's first commercial communications satellite. The 1970s is the decade of the communications satellite; the 1980s promises to usher in the development of space processing—the manufacture in earth orbit of the first of many industrial products that can be made only in the weightlessness of earth orbit. The 1990s should see the first solar power satellites.

Both domestic and international private enterprise is involved. Already the Soviet Union has conducted intensive experimentation in space processing aboard various *Soyuz* and *Soyuz-Salyut* missions. They continue as of this writing.

The Third Industrial Revolution is going to create two areas of concern and interest to military planners in the next thirty to fifty years.

One of these is new technology that will create new problems of defense and military operations. Space industrialization will produce new and less expensive space transportation systems. Space industrialization will produce radically new materials that will have military implications in terms of increased strength, decreased weight, and various other physical properties. Space industrialization will also produce very large energy collectors and transmission devices in space.

The second area of concern involves the fact that the Third Industrial Revolution will create property of value in space—communications satellites, information-handling satellites, manned space laboratories, manned and unmanned space factories, solar power satellites, lunar mining stations and outposts, lunar and orbital catapults or "mass drivers," and other facilities. There will be human activity in space connected with each of these. These facilities will also have commercial value, property value, and even military threat value. Where there exist arenas of human activity and inter-relationships and property, there will be disagreements and conflict. We cannot expect these aspects of human nature to change in the next fifty years.

Therefore as we go into space we will have to take

our highly-evolved cultural heritages and societal organizations with us to forestall disagreements and to resolve conflicts. There are the rules, codes, regulations, laws, and treaties that we have individually and collectively agreed to observe. But they are effective only when the majority of people involved agree to abide by them, and when means exist to enforce compliance with them.

These means of enforcement include the military police organizations. There is a very fine line of distinction between a military organization and a police organization. In some cultures and nations, the distinction cannot be drawn at all. In our Anglo-American culture, the police handle the affairs of internal compliance while the military organization handles the enforcement of trans-national agreements including protection of property from seizure or destruction by other nations.

Therefore, the Third Industrial Revolution is not only going to require military/police protection of space property but will present military organizations with new technology. Both of these involve new military doctrines for use in earth-luna space . or cis-lunar space, that being the portion of space that exists between the Planet Earth and the orbit of its satellite, the Moon.

Protection of space property is very dependent upon the basic military rationales, doctrines, and operational realities of cis-lunar celestial mechanics. Celestial mechanics involves the way objects move in space with relationship to various gravitational fields. It is no longer a subject for mere academic discussion or scientific utility in aiming space probes. Celestial mechanics becomes the cornerstone of space strategic and tactical doc-

trines.

There will be military operations in space above and beyond those necessary for protection of space properties.

Historians Will and Ariel Durant have pointed out, "In every century the generals and rulers (with rare exceptions like Ashoka and Augustus) have smiled at the philosophers' timid dislike of war . . . War is one of the constants of history, and has not diminished with civilization or democracy. In the last 3,421 years of recorded history, only 268 have seen no war."

Anthropologist Dr. Carleton S. Coon has succinctly summarized the prevailing philosophy of the majority of the peoples (and therefore their governments) of the world in what he terms the "Neolithic philosophy: You stay in your village and I will stay in mine. If your sheep eat our grass we will kill you, or we may kill you anyhow to get all the grass for our own sheep. Anyone who tries to change our ways is a witch and we will kill him. Keep out of our village!" This Neolithic philosophy was successful for its time as an attempt to cope with a world where shortages and outright lack of basic survival necessities have been the norm. It created the "Atilla Syndrome," a least-effort way of acquiring what one wants and does not have: "Take it by force."

The rational antithesis of the Atilla Syndrome has existed only briefly in recent history. It came into being about 250 years ago as a philosophical buttress to the First Industrial Revolution and it was a better least-effort solution: "Make it, don't take it, and everybody has more." This may be termed "The Industrial Syndrome."

Until the Neolithic philosophy of Coon disappears from the human race (if it ever does; it may be an important long-term survival trait), it would be folly to believe that mankind will disarm and settle all disputes by negotiation. The arts of diplomacy and politics are not yet rigorous enough to prevent us from killing each other all of the time . . . just some of the time. It is a very delicate evolving system that requires the lubrication of learned responses and manners. It is very susceptible to sand thrown in the works by charismatic leaders, "men on horseback." Its effectiveness is supported only by the veiled threat of physical force that could or might be brought to bear should diplomacy fail.

Until we manage to eradicate the Neolithic philosophy and its Atilla Syndrome from the majority of the human race—if we ever do—there will be military implications to everything we do, like it or not.

This led to late pioneer futurist, Dandridge M. Cole, to formulate in 1960 his famous "Panama Theory" of the military utilization of space. This theory is briefly stated:

"There are strategic areas in space—vital to future scientific, military, and commercial space programs—which could be excluded from our use through occupation and control by unfriendly powers. This statement is based on the assumption that in colonizing space, man (and/other intelligent beings) will compete for the more desirable areas . . ."

When this is applied to military space operations in the Earth-Moon system, the prime strategic doctrine is that of the "gravity well."

The gravity well is a concept first put forth by Dr. Robert S. Richardson, then of Mount Wilson Observatory, and reported by Arthur C. Clarke in his pioneering 1950 book on space, *Interplanetary Flight*. Because of Earth's gravity field, our planet can be considered as being at the bottom of a tapering well some 4000 miles deep. Near the bottom of the well, the walls are very steep; as one reaches the top of the "gravity well," the sides become less steep until, at the top of this funnel, we have reached a nearly flat plain which is dimpled by another, smaller, shallower gravity well some 240,000 miles away, the gravity well of the Moon. While this is a simplification, it conveys the concept of the gravity well.

To climb up the gravity well from the planetary surface requires a great deal of energy. Partway up the gravity well, it is possible to maintain the position of an object by making it spin around the surface of the funnel rapidly enough so that centrifugal force neatly balances the gravitational force tending to pull the object back to the planet at the bottom of the funnel. To get away from the earth, one must project an object such as a space vehicle up the side of the gravitational well at an initial speed of 7 miles per second; it then climbs the walls of the well and, if its direction and speed are just right, crosses the nearly level plain at the top until it falls into the gravity well of the Moon. Or goes on outward into the Solar System, in which case our gravity well model must be expanded to include the very powerful gravity well of the Sun. But since we are considering only the Earth-Moon system herein, the simple model will suffice.

The strategic implications of the gravity well in

military space operations require that one be at the top of a gravity well or at least higher up the well than the adversary.

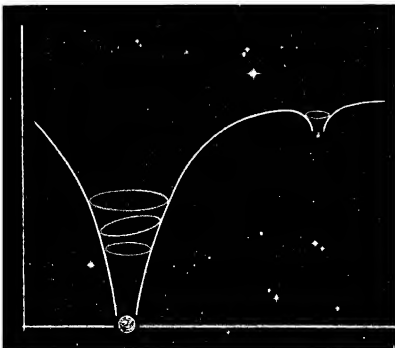
The planet-bound analogy to this is the doctrine of the "high ground." In naval tactics during the age of sail, it was the "wind gauge"; or getting upwind of the enemy.

The salient feature of the gravity well doctrine is the fact that it provides both an energy advantage and a maneuvering advantage to the person on the high ground. It requires far less energy in the form of propulsion and propellants to operate high on the gravity well, and it is possible to maneuver with relative ease and flexibility at or near the top of it.

A simple analogy indicates the basic military advantage: Put one man at the bottom of a well and the other at the top of a well. Give them both rocks to throw at each other. Which man is going to get hurt? Which man has more time to see his opponent's rocks coming and more opportunity to get out of the way? Which man has the greater opportunity to do something about the oncoming rock?.

In Earth-Moon orbital space the person having a base of maneuver on top of a deep gravity well or in a shallower gravity well than his opponent has a definite military advantage in terms of surveillance capability, energy required to affect a strike, maneuvering room, and the ability to activate countermeasures in reasonable time.

The logical consequence of the gravity well doctrine leads inevitably to the most important military fact of the late 20th Century and the early 21st Century: With improvements in space transportation available and with the technology in hand to maintain long-term military positions in space, the



A representation of the gravity wells of the Earth-Moon system. A gravity well can be thought of as a funnel-shaped pit with a celestial body at the bottom. To get out of a gravity well, one must project a space vehicle up the wall of the gravity well with enough velocity to get over the edge. To orbit around the sides of the gravity well funnel, a spacecraft must be given enough velocity for the centrifugal force to balance the pull of gravity.

control of the Moon means control of the Earth. In a like manner, according to this doctrine, *control of the L4 and L5 libration points in the lunar orbit means control of the Earth-Moon system.*

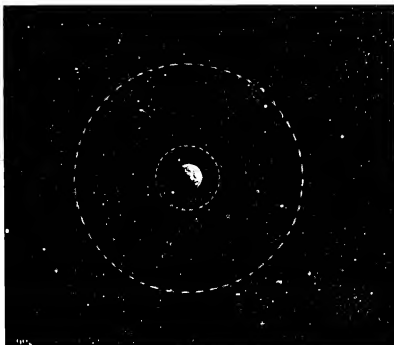
Control implies that one is able to regulate the flow of space-going commerce and other traffic, to protect one's own facilities in space, to deny the use of other critical military *and/or* commercial orbital areas to others, to launch strikes against *any* target on the surface of the Earth *or* the Moon or in any orbit in the Earth-Moon system, or to detect any oncoming threat and take counteraction in time.

The gravity well doctrine dictates the general considerations for space weapons systems that would be most effective. However, one must first take a careful look at the basic concept of a weapon.

A weapon can be broadly defined as a means of imposing one's will upon another. Thus, a weapon need not have a physical reality; the threat of the use of a weapon is itself a weapon—if the opponent believes the said weapon exists and will be used.

Heinlein defines a weapon as a machine for the manipulation of energy. But it has a broader definition than that. The following categorization of weapons may be useful in determining those that would be most useful in various operational zones of the Earth-Moon system and may also provide a key to the discovery of new and heretofore unsuspected space weapons that could be developed and used with the technology of the Third Industrial Revolution.

Mass manipulators: Produce damage through the use of the basic inertial characteristics of mass



The various military operational areas of the Earth-Moon system, not to scale. Near-Earth Orbit extends from an altitude of about 50 kilometers above the Earth out to about 200 kilometers. Cis-Lunar Space extends from 200 kilometers to the orbit of the Moon. Lunar Surface/Orbit extends from the surface of the Moon to about 100 kilometers above the Moon. And Translunar Space extends from the orbit of the Moon outwards to about a million kilometers where the gravity field of the Sun dominates spacecraft motion.

and the conversion of energy of position (potential energy) to energy of motion (kinetic energy): mass projectors, penetrators, detectors, and decoys.

Energy manipulators: Produce damage through the application of high energy density or the sudden release of large amounts of energy: projectors, concentrators, releasers, screens, and detectors.

Biological manipulators: Produce damage to organic life forms or other chemical agents: gases, poisons, disease vectors, etc.

Psychological manipulators: Produce alteration of the mental state of the enemy in a desirable fashion that reduces the will or capability to resist: propaganda, counterintelligence, brain-washing, covert manipulation of the information media, mood-altering drugs, consciousness-altering drugs, mind-altering drugs.

Some weapons are a combination of one or more of these basic types, and some require a vehicle to transport them to the point of use or application.

Use of these weapons in accordance with the strategic doctrine of the gravity well requires in turn that we consider the Earth-Moon system to consist of a series of definite military operational areas. These are basically zones within the gravity well or, for a better mental view, a series of concentric spheres with the Earth at the center. These are no so much well-defined spheres with distinct boundaries, but rather zones of operation that fade into one another. In a sense, they resemble the energy levels of electrons around an atomic nucleus. Briefly, these zones may be defined as:

Near Earth Orbit (NEO) extending from an arbitrary level of 50 kilometers above the Earth's surface

to approximately 200 kilometers—well below the lower limits of the Van Allen radiation belts.

Cis-lunar Space (CLS) extending from about 200 kilometers above the Earth's surface to the geosynchronous orbital altitude of about 39,000 kilometers.

Lunar Surface/Orbit (LSO) extending from geosynchronous orbit to the lunar orbit about the Earth and including the *Near Lunar Orbits* with an arbitrary altitude of about 100 kilometers from the lunar surface.

Translunar Space (TLS) extending from the lunar orbit out to an arbitrary distance of approximately one million kilometers from the surface of the Earth at which distance an object can be considered to be in orbit around the Sun due to the much greater influence of the solar gravity field at that distance.

Each operational area has unique military considerations that affect tactical doctrine, tactical operations, and weapons systems within each area.

Near Earth Orbit is a valuable military operational area for earth-launched, earth-oriented activities and of course is already being used as such; it is an area that is easily reached from the earth's surface by spacecraft capable of attaining velocities of about 25,000 feet per second. So far during this decade at least six nations have begun conducting reconnaissance and surveillance operations there—and at least two nations operate manned spacecraft in the area. In the years to come NEO could be used for quick-look and high-detail surveillance, satellite hunter-killer operations, a staging area for manned surface-to-surface troop strike transports, and "quick dip" hypersonic skimming into the upper atmosphere for surveillance, recon-

aissance, or offensive purposes. Thus, NEO is basically a tactical scouting area for earth-centered operations and a maneuvering area for surface-to-surface operations. It is also the area through which surface-to-surface ICBM's must travel during the ballistic portion of their flight and therefore the area in which they are most vulnerable to intercept by orbital-launched interceptors or orbital beam weapons. Although NEO is reasonably far up on the sides of the gravity well funnel in terms of the energy requirements needed to reach the area from the earth's surface, current technology permits the deployment of rapid-ascent satellite interceptors. Thus NEO is an area where it is difficult to respond to threat: a nearness to counter-weapons on the surface or in orbit, and large energy expenditures are required for maneuver in the area. The possibility of basing a large manned military space station in NEO should be dismissed; it would be a very large target in a predictable trajectory and would be destroyed in the opening moments of any war in which its presence could be a factor.

Cis-lunar space, however is a more valuable zone of maneuver and reconnaissance. Not only is less energy required for maneuver but geosynchronous orbit lies in CLS, making it a prime location for surveillance, navigational, communications, data transfer, meteorological, and energy satellites. Geosynchronous orbit is already crowded. As of mid-1977, there were more than a hundred unmanned satellites located in geosynchronous orbit. Because of orbital crowding and the possibility of frequency interference caused by beam overlapping, these numerous small satellites will be replaced in the late 1980s and the 1990s with large,

multi-purpose platforms which will be militarily vulnerable.

However, facilities in CLS are more secure from earth-launched offensive operations because of the time required for vehicles to climb the gravity well. Various location and detection systems sited in NEO and CLS may be used to identify any potential threat with sufficient early-warning time to permit initiation of counter-activities.

The primary consideration of CLS from the military point of view is the strategic importance of the trojan libration points in the lunar orbit. More of this later.

Lunar surface/orbit has quite different military characteristics. Because of the mass of Luna, it is a prime location for a military base on or probably beneath its surface. It is the prime location for one of the most important space weapons systems we can now foresee, a weapon system that is basically very old. This device is the catapult, usually referred to in current terminology as a "mass driver." Whatever term is used to identify it, it is a rock-thrower. The Moon is the best site in the Earth-Moon system for such a device because the mass of the Moon provides ample ammunition for the mass driver as well as a very large and stable base to improve its accuracy. Launching very large masses at speeds of a mile per second or more produces some massive reaction forces which would misalign or reorient any mass driver located on its own in orbital space.

The lunar mass driver is a critical system requirement for the overall industrialization of the Earth-Moon system. Although an Earth-based mass driver is a potential commercial cargo trans-

portation system for terrestrial materials launched into space, the energy requirements are very large because of the Earth's atmosphere and the very deep gravity well; the lunar mass driver is the most economical cargo transportation device now envisioned for providing materials for space industrialization, including the materials to construct large space structures. It will undoubtedly be built in several locations on the lunar surface for providing lunar materials for deep space operations in the Earth-Moon system. However, it has a military utility that cannot and must not be overlooked.

A large lunar mass driver capable of hurling masses of up to one ton can be converted into an earth bombardment system. It is a non-nuclear weapon and not subject to existing UN treaties! The results of the sudden dissipation of large amounts of kinetic energy should not be lightly dismissed. The Barringer Meteor Crater in Arizona was created by the impact of an estimated 80-foot diameter nickel-iron meteorite; the impact was roughly equivalent to the detonation of 2,500,000 tons of TNT—read that as a 2.5 megaton bomb.

Small lunar mass drivers can be used as weapons systems against space facilities. Such small mass drivers can be considered as space Gatling guns. Such a small mass driver is envisioned as throwing a mass of a couple of kilograms, but throwing such small masses in very rapid succession. The impact of a one kilogram mass travelling at several miles per second can do considerable damage to a space facility—such as when several hundred or thousand such masses impact a solar power satellite, the iridescent solar panels of a reconnaissance satellite, or the pressure hull of a manned space



station.

No explosives are required for such space weapons; the conversion of kinetic energy to heat is quite sufficient.

The military capabilities of mass drivers built and used for commercial purposes are such that they will require protection against seizure or destruction, wherever they are built and operated.

The area of military operations beyond the lunar orbit that we have tagged "Translunar Space" is a zone of maneuver and rendezvous for military space vehicles with very large propulsion and maneuvering capabilities. There is a location in this area, however, that could be used as a military staging point. Beyond the Moon's orbit along the Earth-Moon line lies a zone in space where the gravity fields of both the Earth and the Moon balance one another; this is known as the L2 lunar libration point. Anything placed at the L2 point will stay there, hidden from view of anyone on the surface of the Earth or on the earthside of the Moon.

There are two other locations in the Earth-Moon system that are of the utmost military importance. These are the so-called "trojan" lunar libration points. They are the result of a special and unique solution to the classical "three body" problem in celestial mechanics. There is a zone in the Moon's orbit 60-degrees behind or following the Moon in the orbit and 60 degrees ahead of the Moon; these are stable points where the gravity field of the Earth and the Moon are balanced or equalled-out. An object placed in either of these two libration points—labeled L4 and L5 for convenience—will stay there. L4 and L5 are the two most stable of the

libration points in the Earth-Moon system.

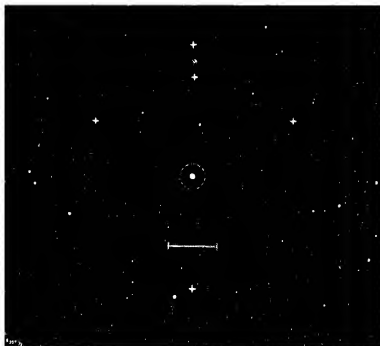
The importance of the L4 and L5 libration points from a military viewpoint is the fact that neither has a gravity well and both sit at the top of the gravity wells of both the Earth and the Moon. From the L4/L5 points, one can control the gravity wells of the entire Earth-Moon system.

These libration points have no gravity wells. A zero gravity well means the greatest capability for maneuver with the minimum amount of energy and denies the use of a gravity well to an adversary for his purposes.

At L4/L5, one sits on top of the hill, so to speak. These points are the most difficult places to reach in the Earth-Moon system from the energy expenditure point of view. They are therefore the best places to site any military bases because they are defensible. They are the best locations for small mass drivers and high-energy beam weapons.

L4/L5 are proposed as the locations of large future space settlements by O'Neill and the L5 Society. Nowhere in the extensive literature about this proposal is there to be found any discussion of the military implications of these L4/L5 sites. If the military implications were considered, they were either dismissed as unimportant or simply ignored for philosophical/ideological reasons.

There is no guarantee that any space settlements at the L4/L5 locations—or on the Moon either, for that matter—will remain peaceful industrial or commercial activities. Writers such as Heinlein and Bova have already speculated on scenarios involving revolutions and seizures of such space settlements. There are any number of grievances that can and have triggered military uprisings. There



The Earth-Moon system, drawn to scale, showing the relative locations of geosynchronous orbit, the Moon, and the five lunar libration points. Libration points L1, L2, and L3 are considered to be "unstable" because some energy will have to be expended to maintain an object at these locations. However, the L4 and L5 libration points are "stable."

are any number of reasons or lessons from history wherein an industrious, hard-working group of close-knit people have taken a sharp turn in their external affairs to become a military threat.

And there are any number of scenarios that can be developed around the seizure and takeover of a large L4/L5 space settlement for military reasons. These reasons might include control of the settlement's product of value—energy or materials—or straightaway military control of the facility to exert military pressure on nations on Earth.

There are therefore two roles for military space operations involving the space settlements at L4/L5: (a) military protective force or presence, similar to that of the U.S. Army in the American West following the Civil War, for the purpose of protecting the settlements against takeover or prevention of the use of military force by the inhabitants of the settlements, or (b) straightforward use of part of the L4/L5 space settlements as an admitted military base of operations for control of the Earth-Moon system.

This last will be argued vehemently. However, are we very certain that the space settlements under consideration will be built or even occupied forever by the sort of hard-working, industrious, peace-loving Anglo-American types now envisaged as populating these settlements by advocates?

One must point out that there are social characteristics of many basically militant Oriental cultures that would make their people optimum space settlers, characteristics such as the ability to live in high-density quarters with little or no privacy, subjugation of the individual to the group, highly structured manners and other inter-personal inter-

faces, and unquestioning willingness of the individual to follow the directives of authority figures. The military in these cultures now lies barely beneath the surface of the culture, hidden from recent conquerors in some cases.

How will this situation be handled? The author can only point to the problem. It will take the best minds and the most careful diplomacy of the next fifty to one hundred years to begin to find workable solutions to the basic problem.

The L4/L5 points may be declared demilitarized international zones; this may work for a time, but from a historic point of view, treaties are rarely inviolate for as long as fifty years and practically never in force a century after their signing.

By international agreement, a balance of power situation may be established with adversaries controlling the two lunar libration points in a carry-over into space of the current USA-USSR balance of strategic power.

We may also find that the Third Industrial Revolution takes into space many of the current industrial security activities that surround most business operations in a quiet, unobtrusive, but highly effective manner. The military may indeed be present in space as they already are. There may also be another type of organization in space connected with space industrialization: a police force, the security guard, and company cops.

It is often easier to get into a secure military base than it is to gain access to a factory. Industrial security is much more stringent than military security; this is a statement of observed fact.

We may find that firms involved in space indus-

trialization would rather hire mercenaries than depend upon military protection from a government. Firms such as Brinks, Wells Fargo, Purolator, and other private security organizations may end up in space along with many of the industrial firms they presently protect.

Each advance of humanity into new and different environments has created new types of social organizations to handle the new problems presented by the advance. Our expansion into space in the Third Industrial Revolution is no exception. We are beginning to see the development of new types of social organization to handle the knotty problems of raising large amount of capital to finance high-risk, long-term projects such as solar power satellites. The Third Industrial Revolution presents other difficult problems, as we have seen. We must therefore anticipate the development of new types of military organizations that might evolve to handle the very difficult problems arising from the military implications of our expansion into space.

We cannot ignore the reality of the military implications of space any more than we can ignore the reality of our home town lives by disbanding the town police force. We can attempt to build a universe of law where matters of human conflict can be solved by judgment, arbitration or negotiation. But this universe of law must be backed up by the means to enforce the rules through application of physical coercion. This will always be the case as long as the Atilla Syndrome exists in the human race . . . and that may be for a very long time to come if we meet, Out There, another species that is as mean, as nasty, and as highly competitive as we are.

But that is another story. ●

BIBLIOGRAPHY

- The Lessons of History*, Will and Ariel Durant, Simon and Schuster, New York, 1968
- The Story of Man*, Carleton S. Coon, Alfred A. Knopf, Inc., New York, 1962
- "Strategic Areas In Space—The Panama Theory," Dandridge M. Cole, Institute of Aerospace Sciences, Los Angeles, March 15, 1962.
- Interplanetary Flight*, Arthur C. Clarke, Harper & Bros., New York, 1950.
- The Moon Is A Harsh Mistress*, Robert A. Heinlein, G. P. Putnam's Sons, New York, 1966.
- The Third Industrial Revolution*, G. Harry Stine, G. P. Putnam's Sons, New York, 1975, Revised Edition, Ace Books, New York, 1979.
- Colony*, Ben Bova, Simon & Schuster, New York, 1978.
- Exploring The Secrets of Space*, I. M. Levitt and Dandridge M. Cole, Prentice-Hall, Englewood Cliffs, New Jersey, 1963.



MALTHUS' LAST LAUGH

by Eric Vinicoff
and Marcia Martin



There is no such thing as a permanent solution.

The President stared at the group of strangers seated about the massive table. Though he had worked with them for a term and a half they were 'friends' only by virtue of political necessity. "Anything else in the way of *new* business?" he asked with barely concealed irritation, cutting off in mid-flow the Secretary of Defense, who had been sliding smoothly from a report on the killer-satellite project into a plea for more funds.

"We have something," Secretary of State Schustoff said, nodding to Director Andrioli of the CIA.

A short, slim and dapper old gentleman, Schustoff was Georgetown's most prominent international affairs scholar, and the President was still a bit awed by him. Director Andrioli was also short, though not so slim, but he burned with energy and controlled emotion. Career CIA, his morality was dubious but his loyalty to the nation was not. Still, his appointment had been a necessary sop to the party machinery. Nivling had no love for him.

"Why isn't it on the agenda?" he snapped.

"Too sensitive, sir," Director Andrioli answered. President Nivling tensed. This was going to be a bad one.

"Go ahead."

Secretary Schustoff pulled copies of a thin report from his attache case and passed them around. "This is an in-house analysis of the food situation in India, from information compiled by Director Andrioli. All triple verified, of course."

For minutes the room was silent except for the flipping of pages as the National Security Council members studied the report.

The President read with a growing horror born of an imagination capable of translating words into reality. When he finished, his copy dropped from nerveless fingers. As if that were a signal, Andrioli spoke again. "The projections indicate they'll top the billion population mark within eighteen months. By then starvation deaths will be over twelve thousand a week." Pause. "There are rumors of cannibalism in the northern provinces due to the disastrous harvest. Hard to believe in view of their vegetarian tradition but these days, who knows."

The President shook his head. "We'll have to step up our grain shipments."

"That won't help, I'm afraid. Our maximum effort along that line could only push back the date of total collapse a few months. The calculations are on page eight, in a footnote."

"But what about the birth control measures the Indian government is taking?"

"Ineffective. Too little, too late. The people are strong traditionalists, and children have always meant more bodies to earn money for the family, more hope for the future. The compulsory sterilization policy of the Gandhi regime was a major factor in Desai's victory over Gandhi in 1977. The Indian people won't be forced to change. There's too much inertia to overcome in the time left."

"What's this stuff here about a collapse?" the Secretary of Defense asked. He was a Washington fixture, competent but not brilliant.

The Secretary of State turned to him. "It's all in the report. Their food supply isn't keeping up with

population growth. Mass starvation and food riots have already begun. Within five years—social disintegration. Within seven years—the collapse of civilization in India.”

“Followed undoubtedly by conquest by China,” Director Andrioli added.

“We can’t let that happen, any of it. Aside from simple humanitarian horror at the deaths of millions of people, there’s the matter of, ah . . . essential US interests. It isn’t just India, grave though its fall to the Chinese would be; it’s just the closest to the brink. The entire Third World is facing eventual population/starvation collapse. Which would be disastrous to our military bases there, the flow of vital resources, US business interests and our overall security.”

“You paint a bleak picture,” the President said. “What can we do about it?”

Director Andrioli leaned forward. “We have a drug, top-secret and brand new. It sterilizes both men and women. It induces temporary sterility with a combination of hormones, then a laboratory-mutated virus causes a self-limiting low grade infection of the reproductive tract. There are no external symptoms, but the infection eventually causes scar tissue that makes the sterilization permanent. Then the infection dies.

“With this drug cheap, easy mass sterilization can be carried out. If such a program is begun *now*, the analysis shows it can solve the problem.”

The President smiled bitterly. “Hitler or Attila might have been able to impose such a drastic measure. But I know of no current leader who would even dare, especially not a coalition Prime Minister like Chadda. It would be political—and



maybe actual—suicide.”

“Yes, sir. We can’t leave it to them. We have to do it ourselves.”

“What exactly are you saying?”

“T-17 can be administered by ingestion. We could insinuate it into our Food For Peace shipments. The grain reaches hundreds of millions in India.”

“How does that solve the starvation problem?”

“The current population will continue to die from starvation, illness and other natural causes.

That plus radically fewer babies being born will cause the population to plummet to a lower and manageable level."

"All this without telling the Indian government?" President Nivling was getting hot.

"They would hardly approve."

"You're damned right they wouldn't! How would *you* like it if they clipped *your* wings?"

The Secretary of State cut in smoothly. "Granted it's not pleasant. But this is a situation where you have only two options; death for hundreds of millions and collapse of the Third World, with all that would mean to us, or mass forced sterilization."

"I don't like those options! I want every scrap of raw data you have on my desk tomorrow. I'll have to study this, see what's going on. For example, what happens if and when the Indian government figures out what we've done? At least they would turn politically to the USSR. Even war isn't inconceivable—they have A-weapons."

"That won't happen. By the time the sterility is observed, there will be no way to trace it to the grain. It'll have all the earmarks of a new disease."

"We're ready to go if you say the word," Director Andrioli said eagerly. "But the major grain shipments for the year go out this month. If we don't begin insinuating T-17 within six days, you may as well forget it. Next year will be too late to prevent the collapse."

The Secretary of State nodded in agreement.

President Nivling rose. "I don't like being pushed, gentlemen. Your job is to supply me with complete, accurate information, and implement my decisions." He let out a long sigh. "We'll talk again before the end of the week. Good day."

Visit Santa Monica, California. Go to Ocean Avenue, just south of the pier and near the beach. There, unobtrusive amid the other downtown fixtures, stands a modern twelve-story building. Palm trees lend the scene a tropical flavor. The name carved into the modest white marble slab on the lawn reads RAND CORPORATION.

Five floors up, staring out at a slender patch of blue ocean between beach-front motels, Doctor Francis 'Bud' Plant wondered why none of the dozens of economic theories he knew could explain what was going on out there.

Jim poked his head in the door. "Thinking?"

"Not productively. Come on in."

Doctor James Ware was a biologist, a recognized expert on enzymes even though he was only a couple of years older than Bud's thirty-one. His styled blond hair and flashy clothes, at odds with Bud's suit, derived from the mind-set of his jazz trumpeting hobby. "No time. I just popped in to say goodbye."

"Bye? Where are you going?" Bud rose, somewhat upset. Jim was the best friend he had around Rand. "What happened?"

A bit of tension entered Jim's face. "Mind dropping by my office for a bit? I have something to show you."

"Sure."

As they walked along gleaming corridors Jim said, "I'm off to Peking. Tomorrow."

"You got your grant! Congratulations!"

He gave Bud that tense look again. "Miraculously. Not to mention with head-spinning celerity."

"How'd it happen?"

"Who knows what passes for thought processes in Washington. First it's no go—Ti Hua Chi's work on enzyme production by gene splicing in bacteria didn't impress them. Now all of a sudden I'm on my way."

"You just got back from that Department of Agriculture thing last week."

"Yeah, not much of a home life. Good thing I'm my only tax deduction."

They entered Jim's office, where stereo gear and records fought texts for shelf space. Jim motioned Bud to a chair, made them both martinis at the bar shelf, then settled behind his desk. "I'll be gone maybe a year. Can I bring you something?"

"Actually, you can tell me what this scene is all about."

Jim put down his glass and pulled a small vial from a desk drawer. "You know why I never said anything about the Agriculture job?"

"Security, what else."

"What else. Well, I'm going to break training this once because something strange is going on."

Bud twisted in his seat, recalling his fellow Randite Dan Ellsberg. "I'm not sure I want in."

"Listen, Bud. This is important. So important that I think Agriculture is afraid of it. To begin at the beginning, I was set up with a team and funding at the UC Davis labs. Agriculture wanted food extenders; you know, hamburger helper and like that.

"I went them ten better. I had already done some preliminary work on cellulase. We solved the three main problems; commercial bulk creation, processes for using it and texturizing/flavoring the product."

Bud shook his head. "You're losing me. Cellulase

I know; an enzyme created by bacteria in the stomachs of ruminant animals. So?" He had absorbed a bit of biology through social osmosis.

"So this. Take rice, the staple of the Asian nations. Never enough of it, so the poor go hungry. But think of the tragic waste. Of the whole plant, only the rice grains are edible. The vast majority of the plant is thrown away."

"Fat lot of good it would do them to eat the plant. Granted, it might contain vitamins and minerals. But it's mainly cellulose, a sugar the body can't digest."

"True. That's where cellulase comes in. Ruminants like cows use cellulase excreted by bacteria in their stomachs to convert grass—mostly cellulose—to glucose, which their bodies can utilize. And so can we. Sugar. Food energy. You get my drift?"

"I hope not. I don't want any new bacteria in my stomach, and I don't like the taste of grass. Tried it as a kid."

"Don't be dense. The bacteria isn't compatible anyway. But some fungal growths also produce cellulase. The African termites of the subfamily *Macrotermitinae* grow a fungus, *Termitomyces*, in special gardens within their giant hill nests. This fungus is eaten by the termites and enables them to digest cellulose. The fungus produced cellulase. We experimented with cultivating and processing the fungus, and determined that cellulase could be produced economically in bulk quantities. We had a bit of trouble simulating the termite excrement in which the fungus grows—"

"Feel free not to elaborate on that."

Jim shot him a dirty look. "Next came food proc-

essing and texturizing techniques. Just about any plant matter that isn't poisonous can be used—stalks, wood, leaves, roots and so on. Even furniture and books, for that matter. Vitamins and minerals can be inserted where not naturally present.

"Converting the glucose to starch is a simpler trick, starch being a polymer of glucose. Amylase is an enzyme that breaks starch down into maltose, and maltase likewise breaks maltose down into glucose. Under proper equilibrium conditions the processes can be reversed. Amylase and maltase can be chemically synthesized."

Bud slouched lower in his seat, wondering how much more lecture was in store.

"Modern texturizing, coloring and flavoring techniques can make the glucose and/or starch resemble just about any natural food, especially when admixed with some of the real thing. The resulting foods are nutritious, non-harmful and non-carcinogenic."

Jim paused and stared down at his desk. "Do you see what I'm saying? A tenfold—at least—increase in food production. And *cheap*—when mass produced, this food could be one fifth the cost of its natural counterparts. That's most likely what caused Agriculture to classify it."

"Just what the world needs, more phony food."

"But it gripes me to see my best work filed and forgotten. They even buried the mandatory report to the GAO." He popped the cap from the vial and poured a few white grains onto his blotter.

Bud picked one up. It looked like rice. He ate it, and it tasted like rice. "Mainly grass," Jim said. "But it even cooks like rice."

"I'm impressed." Then Bud frowned. "What are

you going to do now?"

Jim sighed. "Go to Peking. *Que sera sera.*"

"Then why tell me?"

"Bragging, maybe. Or maybe I wanted someone else to know. Someone I trust. The rest of the team only got bits and pieces. Maybe between the two of us something will come of it someday."

Bud stood up. "We're wasting time. If you're leaving tomorrow, then we've got some serious debauching to do tonight. On me."

"But of course."

Director Andrioli's private office on the top floor of the CIA's Foggy Bottom lair was as dry and devoid of personality as its occupant. He sat on the corner of his desk looking down on the seated Secretary Schustoff. A psych ploy.

They met there because it was the only place they felt safe from the bugs of other federal security agencies (and incidentally foreign spies).

The third man stood by the door. Tall and wire-thin, Secretary of Agriculture Wilkins was the type of nervous chain smoker who slid quickly through ulcers into middle-aged burnout. "The grain goes in three days. Any word from the Man?"

Secretary Schustoff shook his head. "He's still cogitating. It's a hard decision but he'll come around. Are you two ready to act when he acquiesces?"

"My teams are ready to go," Director Andrioli said crisply.

"We're ready to turn the blind eye," Secretary Wilkins added.

"Then what's this meeting about?" Secretary Schustoff demanded of the other two. "It doesn't



look good for me to spend too much time around here."

Secretary Wilkins began pacing. "We may have a problem."

"Indeed?"

"I just received a report from some, ah, associates who've been keeping an eye on one Doctor James Ware. He was the head of Project Ouroboros. De-

spite our plans to get him out of the way for awhile, it seems he's talking."

"Translation," Director Andrioli said maliciously, "his agribusiness-supplied goons have been bugging Ware's environs. They caught him breaking security."

"Project Ouroboros?" Secretary Schustoff scratched his chin. "Sounds like a silly Pentagon code word."

Secretary Wilkins darkened. "Project Ouroboros is a worthy project that succeeded too well. It's a method for producing incredibly cheap and plentiful food. But current market prices barely support farmers as is, and we can't afford more price supports. The new food would totally ruin the farm industry. So we killed it."

"What's that to us?"

Director Andrioli cut in. "You're not thinking too clearly tonight. Cheap, plentiful food? What would the Man do if he heard about that?"

"Hmmm. I see. So much for T-17. It *would* be a more humanitarian alternative, though."

"What!" Secretary Wilkins flared. "At the cost of ruining American farmers! If the Man decides to use Ouroboros in India, the food processors will find out about it! They'll use it here! You let that happen, and I'll blow the cover off your Indian sterilization brainstorm! Try living that disgrace down!"

Secretary Schustoff coughed delicately. "Don't try to threaten me—you aren't big enough. But your point is well taken. We can't weaken the US by destroying the farm industry. The Man is desperately looking for a way out; that pressure might blind him to seeing reason. We must do what's best

for the country."

Director Andrioli nodded. "We can shield him from knowledge of Ouroboros until after the T-17 is on its way."

The meeting adjourned. But as Secretary Wilkins waited in the subterranean garage for his car to be brought around, he smiled. He would show Schustoff and Andrioli how to handle a problem. The men he had borrowed were veterans of Delano and the UFW wars. They knew how to put on pressure.

Bud had never been sick, and he dreaded hospitals because he figured the cosmic accountant was planning something heavy to balance the books. But all that was pushed into the back of his mind by worry as he pushed through the crowded white corridors.

Room 412 was a private—Rand had an excellent medical plan. He went in diffidently.

Jim was popped up in bed, reading Palmatier's *Endocrynal Systems*. That was how Bud recognized him, since most of his head was either bandaged or covered with red welts.

"When I got your call I thought you had taken your hangover too seriously." Bud worked hard to keep it light. "Good thing it's visiting time—that desk nurse could beat up a truck."

Jim closed the book. "Looks like my departure will be delayed a few days."

"At least. You look like shit."

Jim almost chuckled through the gauze. "Great bedside manner. "Aren't you going to ask what happened?"

"You told me on the phone, remember? You were mugged in your parking lot when you got home. A

lot of pain for some credit cards. Damn!"

He gestured for Bud to come closer. When Bud did he whispered, "Listen and keep your trap shut. The two guys who beat on me didn't want money. They told me it was a warning to keep quiet about my cellulase work. They said they could do much worse to me if inspired."

Bud was shocked into a long silence. Then; "What are you going to do? Tell the cops?"

The battered face sighed. "I'm not the hero type. I don't know what's going on, and I don't want to. I don't think they were bluffing. When I get out of here, I'm going to Peking and do work."

"Any idea who they were?"

"I could make guesses, but I don't want to. Thanks for coming. Now you better get out of here."

Bud stared down at him. "You're taking a risk even telling me."

"Maybe. But I'm worried about you. You might be next; if they know I talked, they might know to whom. Try to avoid dark parking lots."

Bud left, and drove to his apartment instead of the office. He felt sick. Things like this were occasionally discussed at Rand as vague rumor. But no one really believed that this brand of cloak-and-dagger stuff still occurred. Subpoenas and firings were one thing; beatings were definitely something else.

What was going on?

He was scared too. He had a low pain threshold. He thought hard.

Maybe there was someone who could answer his questions.

He and Alice Donnaud had gone to Cal Berkeley at the same time, and had known each other in

several senses. Then they had gone their separate ways; he to graduate school, she to work for an aspiring gubernatorial candidate named Nivling. But they kept in touch.

He dialed her Washington home number.

Executive Secretary to the White House Chief of Staff was a much more important position than it sounded, and Alice managed to be on the inside *in re* most Washington happenings.

"Hello?"

"Hi, Alice."

"Bud! How's it going?" Beyond her soft voice he could hear stereo music.

"Hope I didn't interrupt anything."

"Not yet. But we'll have to keep this short—company's coming."

He felt the same old faint ache. "Okay. I need some help."

"What kind?" The guarded tone was that of an old political pro. They were growing apart faster and faster.

"A friend of mine at Rand was beaten up by some goons because he broke security on a project. I think I may be next in line."

Pause. Then; "I'd hate to see that happen. Who's your friend, and what's the security hassle?"

"Doctor James Ware. He told me about a job he just finished: I think it was called Project Ouroboros. For the Department of Agriculture."

"Project Ouroboros doesn't ring any bells. The only sensitive thing around town involving Agriculture is—no, I don't see how that could connect. I can't tell you about it anyway."

"What?"

"Sorry. It's classified way above your Rand clear-

ance."

"Please, Alice! Have I ever blabbed any of your secrets? I may be the next beatee!"

"But I honestly don't see how it could connect."

"Maybe I can!"

She was silent for a long time. "You've got to keep it quiet. It'd mean my career."

"I promise."

"Then listen. The President has been given reports indicating that India is only a few years away from utter famine and collapse due to overpopulation. All possible solutions have been eliminated except one. It involves putting a drug called T-17 into our foreign aid grain shipments, starting with one three days from now.

"T-17 will make the people who ingest it sterile. It was developed for medical use, and would have been damned useful as an alternative to expensive and sometimes dangerous operations. But the CIA took it over for their secret games."

Bud felt empty behind the belt. "My God! Is the President really going to do that?"

"He hasn't said yet. But . . . it doesn't look like he'll have much choice."

"I see. Thanks a lot."

He heard her doorbell ring. "Take care, Bud." Click.

President Nivling lay in an antique bed beside his sleeping wife, worrying. It was an important part of his day, a peaceful time wherein to analyze the day's events and make plans for the next.

As always, there was too much to grasp. Economic indicators. Natural gas rates. The deteriorating navy. SALT IV. The law-and-order bills

being railroaded through Congress by his own party. Ambassador Chin's reception.

But foremost was the bitch that had to be decided tomorrow. He couldn't put it off any longer.

He had been through hours of reports, going at it from every angle. It always came down to Secretary Schustoff's two alternatives.

He didn't want to decide. It was bad enough making impossible choices for the US. He had a mandate of sorts. But how could he justify extending his puppet strings to another country, another people?

National self-interest was a part of it. All the lofty principles of democracy stopped at the border. But what it really came down to was that only one person was in the right place with the right power to prevent a greater tragedy by substituting a smaller one—if he could be *sure*, and bring himself to act.

It would be so easy to let the problem slide. It was only apparent on paper—so far. Let others deal with it later.

When the death rate became too high to ignore. When it was too late to prevent collapse.

And he would know.

The sleeping pill was beginning to drag him under. He let it.

The most interesting thing the brain does is to correlate bits of data. The physical activity involved is still mainly mysterious, and maddeningly irregular. A superfluity of the ability creates genius; a shortage forgetfulness.



The time factor is also inconsistent. Two bits of data, clearly correlatable into a third, can enter a brain and either mesh at once or lie side-by-side for a long time—even forever—without meshing.

Which is all to explain why Bud ate dinner, went to bed and woke up the next day before seeing how Jim's cellulose food could solve India's problem.

He tried to call Alice, but she was gone. According to her service she would be away for a week and couldn't be reached.

Hanging up, he did some heavy thinking. He knew what kind of a person President Nivling was by reputation—if he knew about this alternative he wouldn't even be considering using T-17. And Alice hadn't mentioned it. Ergo—someone was keeping it from the President.

He knew he would have to do something about that. "Situational ethics" weren't his style; he suffered from a highly developed sense of right and wrong. Sterilizing millions of unsuspecting Indians was wrong. Beating up Jim was wrong.

The direct approach was out. The President wouldn't talk to him, and a subordinate might be a part of whatever faction was trying to deceive the President. And a phone call might not be enough to prove the credibility of his tale.

Well, he had been meaning to take a vacation. Today was as good a time as any. He called LA International and made a reservation for an afternoon flight.

Seeing the President without an appointment was impossible and he knew it. He didn't aspire that high—yet. He had a casual acquaintance with Tim Andre, the White House Chief of Staff, Alice's boss, who in turn had the President's ear. *If* Andre

could be convinced, and wasn't in on the coverup, he could arrange a meeting. A phone call would have been cheaper, but he knew the Washington mentality—it would also be less convincing.

After packing, he called Rand. Mister Timmons didn't like him leaving *sans* explanation on such short notice, but grudgingly gave his okay.

Bud called for a cab, then settled into his favorite easychair to sip a drink and wait.

Ten minutes later there came a knock at the door. He went to it, thinking what a joy it was to live in one of the few American cities remaining where poverty, crime and degeneracy hadn't reduced the citizenry to a state of seige. Most other places the cabbie would have honked for him from the street.

He opened the door.

He got a brief view of two hulking male figures in the doorway. Then a fist-shaped explosive went off in his gut. He staggered backward, tripped and fell.

The figures followed him. The door closed behind them, and he vaguely heard the lock slide home.

"You ain't going nowhere," a gravelly voice said.

President Nivling sat at his desk in the Oval Office. Silence lay around him like the eye of a hurricane. Or, more aptly, the small end of a monstrous lever. His slightest motion could change the world. And had. And would again.

"Yes, Mister President." Secretary Schustoff's voice came tinnily through the desktop speaker.

"You still feel there's no alternative to using T-17 immediately?"

"I'm afraid not."

"Then go ahead. I'll call Andrioli and Wilkins to confirm." He slapped the top of the speaker box.



It was as simple as that.

One blurry figure got behind Bud and hoisted him to his feet. The other stood in front of him and demanded, "What did Ware tell you yesterday?"

"Huh?" Bud could hardly hear the words over the roaring pain in his gut.

The hands holding him up slid into a pinioning full nelson. A fist smashed his head way around to the left. Pain and nausea almost put him under, and something wet trickled from his upper lip.

"The main point, buddy, is it shouldn't go further." Another punch slammed his head back the other way. "We're here to make sure you understand that."

There was knocking at the door.

The cabbie.

The figure facing Bud turned to get rid of the

interruption. Bud took the opportunity to scream, "Help!" as loudly as he could.

The figure turned back. But before the fist could lash out again to silence him, Bud took aim at its groin and kicked with what remained of his strength.

Too much was happening at once, and the figure didn't quite dodge in time. His scream cut through Bud's fog. A muffled voice shouted through the door, "What's going on in there?"

The figure sagged to the carpeting.

Bud writhed, but couldn't escape the pinioning arms, which suddenly became bars of steel. The door shook on its hinges from a kick from beyond.

"Get rid of him!" a voice grated over his shoulder. "Quick, or I'll tear your arms off!"

Bud kicked back, hit a shin, and twisted violently. The combination worked. He fell forward.

A second kick sprung the lock, and the door flew open. A young man with a bright yellow cap burst in.

Bud's face hit the floor hard, and he only vaguely heard feet run out into the hallway. The cabbie let out a startled grunt as they shoved past him.

Bud almost blacked out, but surprised himself by hanging together as the cabbie lifted him onto the sofa. His drink, miraculously unspilled, was pressed into his quavering hands. He gulped it down. "Thanks," he murmured.

The floor was deserted—the fallen figure had apparently staggered after its fellow.

"What was it, mister, a burglary?" The cabbie pushed the damaged door shut. "Should I call the cops or an ambulance?"

"No time." Bud pushed himself to his feet. "I've

got a plane to catch. Just time enough to stop by my doctor's office. Come on."

"You're just going to leave your place like this? And not call the cops? That's crazy."

Bud nodded. His mind was still fuzzy, but one thing burned in him. Anger. Someone was going to pay for hurting him.

He didn't know who yet; he didn't know what was going on. But he knew what to do about it. "I've got a plane to catch."

But a bit of rationality seeped back in. He called the manager and arranged for his door to be repaired.

The cab drive to the doctor's office was made in silence. Bud handed the cabbie a bill that made him goggle and wait until Bud was patched up. They reached LA International just in time for Bud to check in for his flight.

The 747 trip was the epitome of normalcy, but Bud suffered an agony of pain and insecurity. He was acutely aware of the stares his battered face drew. More significantly, he felt the terror of knowing from recent brutal experience that the bottom could drop from the most serene existence. There was a snakepit below. He would know that for the rest of his life.

From Dulles International he took a cab, not to a hotel, but straight to the White House.

It was late evening, but lights burned in the great old mansion as the business of government went on into the night.

Bud's Rand security clearance didn't appreciably warm the main gate guards to him, but one did make a grudging call to Mister Andre.

Bud prayed his assessment of Andre's loyalty to

the President was right. And that he hadn't already gone home for the day.

He hadn't. By pleading the urgency of his errand Bud wangled an immediate meeting.

One of the guards escorted him across the grounds and inside.

The tall, ornate halls cowed him as he followed the guard. Everything that had happened began to seem remote in the face of the awesome reality surrounding him. Maybe he was wrong. Maybe he was about to make an incredible fool of himself.

Or maybe not.

They entered an elevator, rode up to the second floor, and exited.

They were beyond the well-trod route, in the part of the White House given over to the offices of the executive branch. A few people moved through the corridor even at this hour; the job never stopped.

He knew Andre's office lay at the far end of the corridor. The guard led him that way.

Three men emerged from a turn in the corridor beyond Andre's office, walking toward him. One was a short, dark Italian. The second was huge, hanging a pace behind the others and clearly a Secret Service agent despite his anonymous suit. The third, listening absently to the Italian's eager chatter, became the subtle focus of attention for everyone in sight.

Bud gambled. He broke away from his escort and rushed over to the third man. "Mister President!"

His escort caught him from behind, while the Italian and the Secret Service agent slid smoothly between him and the President. The latter was deep in thought, and barely noticed what was hap-

pening.

"I have to speak to you, Mister President! You don't have to use T-17! There's another—"

"What's going on here?" the Italian snapped at his escort. "Who let this raving fool in here?"

"Uh," the guard stammered, "he was going to meet Mister Andre. I don't understand—"

"Mister President!" Bud was desperate. "Please! Please listen to me!"

"I'll handle this, sir," the Italian said to the President, who nodded distractedly. The Italian started toward the elevator. "Bring him along!" he snapped at the guard. "Something strange is going on here! We'll get to the bottom of it at Foggy Bottom!"

"Mister President! I must tell you about Project Ouroboros! They're hiding the truth from you—" But President Nivling and the Secret Service agent retreated the way they had come while Bud was all but dragged away.

* * *

As the elevator door shut between them and the President, Director Andrioli allowed himself a small smile that neither Bud nor his escort saw. It had been close. But once in the sanctum sanctorum of the Company, Doctor Plant's threat would be permanently neutralized.

Rough on him, unfortunately, but that was politics. He, Schustoff and Wilkins had to cover their asses. Especially after the latter's incredibly stupid blunder. One didn't work over eminent scientists like itinerant grapepickers—they were prone to calling embarrassing press conferences. But it had all worked out for the best.

Dick Swann had been Secret Service for nine years, and liked his work. He especially liked being one of the Man's personal guards. Tall and thickly built, with a blunt, good-natured face, he looked little like the trained killer he was.

The set-to in the hallway had been strange, but no stranger than many other such incidents. Trouble seemed to dog the Man's heels all the time. But no personal danger had materialized, and that was all he cared about.

He was even used to the Man's trances, when he tuned out to battle inner demons. They had just reentered the Oval Office when he emerged from this one.

He turned to Dick. "What was it that the person out in the hall shouted?"

"Something about T-17, sir. About you not having to use it. And something about a Project Ouroboros. Then Director Andrioli took him away."

A look filled the President's face that caused Dick to back up a step. A grimness, an utter cold he had never seen before. "I see. And Andrioli took him away. Isn't White House security a Secret Service job?"

"Of course, sir. But it seemed Director Andrioli knew something about the nut, so why not let him carry the ball? You did say—"

The President nodded. He went to his desk and sat down. His face disappeared in shadow. "I want to talk to that nut, Dick. Here. Now. Handle it."

Dick swallowed hard. "That might not be so easy, sir. CIA doesn't like taking Secret Service orders."

"On my authority?"

"The problem, sir, is convincing them that we have it. Even with written instructions from you, they could get stuffy about channels and hang onto him for days."

"Let me make myself clear, Dick." The voice was soft, but Dick's breath caught. "Right now Director Andrioli is turning the prisoner over to some of his men downstairs. I don't want them to take him to Foggy Bottom. I don't want them to take him anywhere. I want him here. Now."

Dick looked nervously at the .44 Magnum in his armpit holster. "That could mean trouble, sir."

"The prisoner isn't to leave the White House. Take as many men as you need. Move."

Dick moved.

* * *

Beyond the window shone the sparkling white lights of Washington slums. But that was a world away from the grid of tension in the Oval Office. President Nivling sat behind his desk, with Bud on a chair next to him. Across the desk, seated and facing them, were Secretaries Schustoff and Wilkins and Director Andrioli.

The President's expression was under rigid control. "Thank you for coming so promptly, gentlemen. I've just had a long, fascinating chat with Doctor Plant here. After which I spent about an hour on the phone confirming details."

"I—" Director Andrioli began.

"Shut up. As I was saying, I've arranged for a certain Doctor James Ware to have US Marshal protection until he can be flown here to meet with

me. And warrants are out for two apparently overzealous farm-owner representatives.

"For you three I have only one question. Why?"

"We were trying to spare you a hard but inevitable decision," Secretary Schustoff said smoothly.

"How so?"

"Cellulase processing doesn't really change things," Director Andrioli cut in. "We can't let it be used without destroying the farm industry. T-17 is the only feasible alternative."

Secretary Wilkins nodded. "We can't risk that, sir."

"We!" President Nivling reddened. "No one elected any of you! You had no right to make such decisions, to hide facts from me! And you know it!"

Secretary Schustoff was tight-lipped. "We did what we had to. Your weakness could destroy the country."

"Ah, it comes out. You three know best. Well, run against me next year." He pushed three pieces of paper across the desk. "Letters of resignation. Sign them and get out. I've already selected your replacements and contacted them. The new CIA director, in fact, is even now cancelling the T-17 plan."

The three men paled. Director Andrioli growled, "What makes you think we'll quit?"

"Because if you don't, I'll fire you and tell the nation why. Then Justice will bring criminal charges against you."

"You wouldn't dare."

"Try me. I can wallow as deep in the mud as you or anyone."

Secretary Wilkins' voice quavered. "But if we suddenly resign with no explanation, people will

think something's wrong. Reporters will dig. We'll be disgraced."

"Maybe. But I guarantee it if you don't."

"You're making a serious mistake," Secretary Schustoff said softly. "I know you—you think there's always a pretty answer. You'll build food processing plants in India, and everywhere else food is short. You'll be the savior of the Third World."

"But what of the US? What of the cost of building those plants? What of the drop in domestic food prices? Even now they're so low that hundreds of farmers abandon their land each year."

"You don't think I'll take all those factors into account?"

Silence answered him.

"You can't bluff us," Director Andrioli said. "You wouldn't dare prosecute. We know too much dirt that could come out—"

"Don't try to blackmail me! If I really thought any of you would spill national security secrets, I'd send you to one of the CIA's brain laundries." They paled even more. "But I won't—for now. You're fools, but loyal Americans in your own unhappy way. You'll take the graceful way out."

"Of course mindwipe and criminal prosecution will remain viable options. Remember that."

The three men signed the papers, rose and left in silence.

The retribution wasn't much from where Bud sat, but he accepted it as all he was ever likely to get.

The President was thinking similarly. He cursed the political reality that kept him from prosecuting them.

* * *



President Nivling, Dick Swann unobtrusively at his side, stood at the sampling table in the middle of the ornate hall. Hundreds of elegant Indians and foreigners milled about in cocktail party confusion. His presence was mainly symbolic, but he hoped to have a brief talk with Prime Minister Chadda.

He looked at the spread of food on the long table. Hardly normal party fare. Breads, rice pudding,

vegetables, fresh fruits as well as local favorite dishes like dahi-bara, papadam, sandese, chapattis, halvah, iddli, kedegree and curry pakora. Earlier, before massed cameras, he and the Prime Minister had tried each item and pronounced them tasty. Privately he admitted that, although close, they would never replace natural food.

Not that they would even get the chance in the US. It had been a tough fight: the food processors' lobby and consumers' groups versus agribusiness. But cellulose foods were now banned by Act of Congress.

That afternoon he and the Prime Minister had visited the barely completed plant outside New Delhi, the first of a projected nine. They had seen trucks bringing in plant matter of all sorts, the pulping mill, the tray rooms where *Termitomyces* was grown, the processing vats, the texturizing/flavoring/coloring facility and the finished foods being loaded into other trucks.

"A great day for the hungry world." It was the Prime Minister, who had come up on him from behind. The other guests kept a respectful distance.

"Indeed. And a lovely ceremony to acknowledge it. But you know this isn't a permanent solution, only a stay of execution."

The Prime Minister nodded, frowning. "Ah, yes, Malthus. A population will increase to the ragged limits of its food supply. But that shall not happen here."

"I pray you're right."

"We're making headway with contraceptive education and equipment. The fight against tradition is hard, but we will win. You have given us the time we desperately need."

The President said, "But there are more immediate problems. We are building the plants and supplying key personnel, but you must pay the operating expenses. We need to free up the extra funding to begin plants in Bangladesh, in North Africa, in — many places."

"We are prepared to do our part. But the cost will be high, and for that reason alone our birth control programs must succeed promptly."

"Also don't forget the danger of radical defoliation. Strip the land of all plant matter, and it will become a desert. Doctor Ware told me the world loses thousands of arable square kilometers that way each year as is—we don't want to make it worse."

"You are a fussy old man," the Prime Minister chuckled. "Your scientists and mine have undoubtedly dealt with that danger in their plans. Let's attend to our present duty, Mister President, which is to enjoy this fine celebration."

President Nivling sipped his wine—just about the only non-cellulase food present. At times like this he could almost accept the simplistic notion that he was doing a good job. "An excellent idea. But let's also pray that we and not Malthus have the last laugh." ●

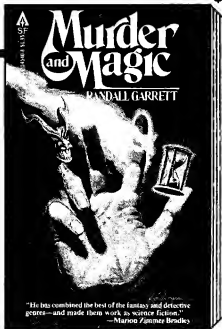
Enter A World Where Crime and the Occult Walk Hand-In-Hand.

Murder and Magic

RANDALL
GARRETT

"He has combined the best of the fantasy and
detective genres—and made them work as science
fiction."—Marion Zimmer Bradley

\$1.95



Available wherever books are sold, or order by mail from Book Mailing
Service, Box 690, Rockville Centre, N.Y. 11571. Please add 50¢ postage and
handling.

111



ACE SCIENCE FICTION
360 PARK AVENUE SOUTH • NEW YORK, N.Y. 10010

FLEAS

BY
DEAN
ING

Every species must,
in the nature of things,
generate its own predator.
Of course it may not
recognize it as such...



The quarry swam more for show than for efficiency because he knew that Maels was quietly watching. Down the "Y" pool, then back, seeming to ignore the bearded older man as Maels, in turn, seemed to ignore the young swimmer.

Maels reviewed each datum: brachycephalic; under thirty years old; body mass well over the forty kilo minimum; skin tone excellent; plenty of hair. And unless Maels was deceived—he rarely was—the quarry offered subtle homosexual nuances which might simplify his isolation.

Maels smiled to himself and delivered an enormous body-stretching yawn that advertised his formidable biceps, triceps, laterals. The quarry approached swimming; symbolically, thought Maels, a breast stroke. Great.

Maels made a pedal gesture. A joke, really, since the gay world had developed the language of the foot for venues more crowded than this. The quarry bared small even teeth in his innocent approval. Better.

"I could watch you all evening," Maels rumbled, and added the necessary lie: "You swim exquisitely."

"But I can't go on forever," the youth replied in tones that were, as Maels had expected, distinctly unbutchy. "I feel like relaxing." Treading water, he smiled a plea for precise communication. Perfect.

"You can with me," Maels said, and swept himself up with an ageless grace. He towered, masculine and commanding, above the suppliant swimmer. A strong grin split his beard as Maels turned toward the dressing room. He left the building quickly, then waited.

Invisible in a shop alcove, Maels enjoyed the quarry's anxious glances from the elevated platform of the "Y" steps. Maels strolled out then into the pale light of the streetlamp and the quarry, seeing him, danced down the steps toward his small destiny.

Later, kneeling beneath tree shadows as his fingers probed the dying throat-pulse, Maels thought: *All according to formula, to the old books*. Really no problem when you have the physical strength of a mature anaconda. Hell, it wasn't even much fun for an adult predator. At this introspection Maels chuckled. Adult for several normal lifespans, once he had discovered he was a feeder. With such long practice, self-assurance in the hunt took spice from the kill. Still probing the carotid artery, Maels thought: *Uncertainty is the oregano of pursuit*. He might work that into a scholarly paper one day.

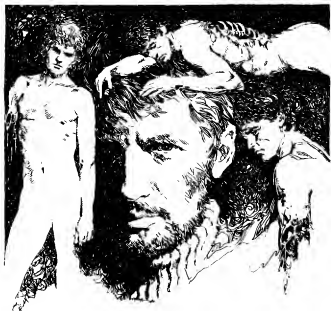
Then Maels fed.

It was a simple matter for Maels to feed in a context that police could classify as psychosexual. Inaccurate, but—perhaps not wholly. Survival and sexuality: his gloved hands guiding scalpel and bone saw almost by rote, Maels composed the sort of trivia his sophomores would love.

Research confirms the grimoires'
Ancient sanity;
Predation brings unending lust—
An old casualty

The hypothalamus, behind armoring bone, was crucial. Maels took it all. Adrenal medulla, a strip of mucous membrane, smear of marrow. Chewing reflectively, Maels thought: *Eye of newt, toe of frog. A long way from the real guts of immortality*.

He had known a feeder, an academic like himself,



who read so much Huxley he tried to substitute carp viscera for the only true prescription. Silly bastard had nearly died before Maels, soft-hearted Karl Maels, brought him the bloody requisites in a baggie. At some personal sacrifice, too: the girl had been Mael's best graduate student in a century.

Sacrifice, he reflected, was one criterion largely ignored by the Darwinists. They prattled so easily of a species as though the single individual mattered little. But if you are one of a rare subspecies, feeders whose members were few and camouflaged? A back-burner question, he decided. He could let it simmer. With admirable economy of motion Maels further vandalized the kill to disguise his motive. Minutes later he was in his rented sedan, en route back to his small college town. Maels felt virile, coruscating, efficient. The seasonal special feeding, in its way, had been a thing of beauty.

Ninety-three days later, Maels drove his own coupe to another city and left it, before dusk, in a parking lot. He was overdue to feed but thought it prudent to avoid patterns. The city, the time of day, even the moon phase should be different. If the feeding itself no longer gave joy, at least he might savor its planning.

He adjusted his turtleneck and inspected the result in a storefront reflection. Maybe he would shave the beard soon. It was a damned nuisance anyhow when he fed.

Maels recalled a student's sly criticism the day before: when was a beard a symbiote, and when parasitic? Maels had turned the question to good classroom use, sparking a lively debate on the definitions of parasite and predator. Maels cited the German Brown trout, predator on its own kind yet not a parasite. The flea was judged parasitic; for the hundredth time Maels was forced to smile through his irritation at misquotation of elegant Dean Swift:

So, naturalists observe, a flea
Hath smaller fleas that on him prey,
And these have smaller fleas to bite 'em,
And so proceed, *ad infinitum*.

Which only prompted the class to define parasites in terms of size. Maels accepted their judgment; trout and feeder preyed on smaller fry, predators by spurious definition.

Comfortably chewing on the trout analogy, Maels cruised the singles bars through their happy hour. He nurtured his image carefully, a massive gentle bear of a man with graceful hands and self-deprecating wit. At the third spa he maneuvered,



on his right, a pliable file clerk with adenoids and lovely skin. She pronounced herself simply thrilled to meet a real, self-admitted traveling salesman. Maels found her rather too plump for ideal quarry, but no matter: she would do. He felt pale stirrings of excitement and honed them, titillated them. Perhaps he would grant her a sexual encounter before he fed. Perhaps.

Then Karl Maels glanced into the mirror behind the bar, and the pliant clerk was instantly and brutally forgotten. He sipped bourbon and his mouth was drier than before as he focused on the girl who had captured the seat to his left.

It was not merely that she was lovely. By all criteria she was also flawless quarry. Maels fought down his excitement and smiled his best smile. "I kept your place," he said with just enough pretended gruffness.

"Am I all that predictable?" Her voice seemed to vibrate in his belly. He estimated her age at twenty-two but, sharing her frank gaze, elevated that estimate a bit.

Maels wisely denied her predictability, asked where she found earrings of beaten gold aspen leaves, and learned that she was from Pueblo, Colorado. To obtain a small commitment he presently said, "The body is a duty, and duty calls. Will you keep my place?"

The long natural lashes barely flickered, the chin rose and dropped a minute fraction. Maels made his needless roundtrip to the men's room, but hesitated on his return. He saw the girl speak a bit crossly to a tall young man who would otherwise have taken Maels' seat. Maels assessed her fine strong calves, the fashionable wedge heels cupping voluptuous high insteps. His palms were sweating.

Maels waited until the younger man had turned away, then reclaimed his seat. After two more drinks he had her name, Barbara, and her weakness, seafood; and knew that he could claim his quarry as well.

He did not need to feign his easy laugh in saying, "Well, now you've made me ravenous. I believe there's a legendary crab cocktail at a restaurant near the wharf. Feel like exploring?"

She did. It was only a short walk, he explained, silently adding that a taxi was risky. Barbara happily took his arm. The subtle elbow pressures, her matching of his stride, the increasing frequency of hip contact were clear messages of desire. When Maels drew her toward the fortuitous schoolyard, Barbara purred in pleasure. Moments later, their coats on an improvised couch, they knelt in mutual

exploration, then lay together in the silent mottled shadows.

He entered her cautiously, then profoundly, gazing down at his quarry with commingled lust and hunger. Smiling, she undid her blouse to reveal perfect breasts. She moved against him gently and, with great deliberation, thrust his sweater up from the broad striated ribcage. Then she pressed erect nipples against his body. Maels cried out once.

When European gentlemen still wore rapiers, Maels had taken a blade in the shoulder. The memory flickered past him as her nipples, hypodermic-sharp, incredibly elongated, pierced him on lances of agony.

Skewered above her, Maels could not move. Indeed, he did not lose his functional virility, as the creature completed her own pleasure and then, grasping his arms, rolled him over without uncoupling. He felt tendons snap in his forearms but oddly the pain was distant. He could think clearly at first. Maels thought: *How easily she rends me*. She manipulated him as one might handle a brittle doll.

Maels felt a warm softening in his guts with a growing anaesthesia. Maels thought: *The creature is consuming me as I watch*.

Maels thought: *A new subspecies?* He wondered how often her kind must feed. *A very old subspecies?* He saw her smile.

Maels thought: *Is it possible that she feeds only on feeders? Does she read my thoughts?*

"Of course," she whispered, almost lovingly.

Some yards away, a tiny animal scrabbled in the leaves.

He thought at her: "...and so on, ad infinitum. I wonder what feeds on you. . . ." ●

**science
fiction
and
science,
part three
on imaginary
science
by poul anderson**

“...THERE ARE NO ‘TWO CULTURES,’
SCIENCE VERSUS THE HUMANITIES,
OR IF THERE ARE, THIS IS
UNFORTUNATE AND UNNECESSARY.”

In the last part of this series we considered hard science fiction and its relationship to science in a preliminary way. I would have preferred to call it “hard core science fiction,” since it belongs so unequivocally to our field and is so central to it. However, that would have made too many present-day readers snicker. What are we going to do for a vocabulary, now that “adult,” “exotic,” and “explicit” all mean “pornographic”?

To recapitulate, hard science fiction is the kind which, ideally, confines the story assumptions to established facts. The author postulates no laws of nature, as yet undiscovered, which would allow things to happen. He reasons logically, sometimes mathematically, what the likely consequences are of the conditions he is setting up. (Or she does, of course; some fine work of this type comes nowadays from women.)

For instance, if he uses a Martian setting, he uses the latest findings about Mars and doesn't contradict any of them. If he puts an imaginary planet in orbit around a particular sort of star, he calculates, or at least estimates, what the results are,

everything from the length of the year to the mean surface temperature. He avoids absurdities such as an atmosphere containing both free oxygen and free hydrogen.

To be sure, he might sketch out a plausible biochemistry which causes organisms on a world with free oxygen to give off hydrogen. Nevertheless, he'll be aware that to the extent the latter gas does not escape into space, it will be oxidized to water in a comparatively short time. The equilibrium concentration of it in the air cannot be very great. How much could be present and what kind of organic processes could produce it are left as an exercise for the reader. This author is tired.

Hard science fiction is not necessarily unimaginative. On the contrary, think of the dazzling creations of Hal Clement, to name only its most obvious practitioner. Though the writer sticks *by* the facts, he is not confined *to* them. Hence, while incorporating the Viking data about Mars, he might propose a possible life form which by its nature has escaped detection. Seeming limitations on him often become challenges. Thus, I've already mentioned how a suggestion by John Campbell showed me a way to have winged beings massive enough for big brains, on an Earthlike world, which had hitherto looked unbelievable. As for future technology, the writer is simply required to describe things which could be built in principle, *e.g.*, a fusion-powered plasma-jet spacecraft which can move at a full gravity or more of acceleration for months on end. He doesn't have to engineer the devices. If he could do that, he wouldn't be preparing stories but patent applications.

Nor need hard science fiction be unemotional.

The scientific background of Ursula K. Le Guin's fine study of a human dilemma, "Nine Lives," is excellent. Mildred Downey Broxon had the consequences of a black hole wandering into a planetary system worked out with exactness before she started to write her tragic "Singularity." If I may cite myself again, though *Tau Zero* was called, by the late James Blish, the ultimate hard science novel, numerous readers, some of whom admitted being baffled by the technicalities, have told me they liked the people.

I mention that one because a point came up in the planning of it which may interest you. For the benefit of those who haven't read it, or did but have forgotten, it concerns a spaceship trapped into traveling closer and closer to the speed of light. (The basic idea for the vessel, a ramscoop, was proposed in the professional literature by a physicist, R. W. Bussard.) According to the laws of relativity, this meant that time onboard went more and more slowly with respect to the rest of the universe, until at last millions of years might go outside while someone drew a breath. Now how could any sense of that vastness be conveyed?

I turned to the works of Olaf Stapledon, two of which are unmatched in their awesome scale, to find out how he had made me feel it. That proved to be by a more or less logarithmic progression, which gets us accustomed to one order of magnitude before moving on to the next. Accordingly, I laid out my chapters likewise. The first occupies a few hours on the galactic clock, the second a few days, the third a few months, and so on. Each span is approximately ten times as long as the previous one. It seems to have worked pretty well, producing

emotional impact. But the real credit belongs to Stapledon. And the real moral is that either there are no "two cultures," science *versus* the humanities, or if there are, this is unfortunate and unnecessary.

The book has been used to help teach relativity, which pleases me far more than if it were in an English course. Yet a few readers have argued the plausibility of certain things in it. For example, would not the increasing intensity of gravitational radiation come to shed energy as fast as the ship could gain it, thereby setting a speed limit? I don't know myself, but, again, I'm happy that knowledgeable individuals found my ideas worth that much consideration.

Being caught out in error is, of course, an occupational hazard of the hard science fiction writer. The out-and-out inevitability he faces is that the scientific picture he employed will change. Once the first Pioneer flyby had sent back its readings on Jupiter, virtually every story ever written about that planet or its moons, no matter how carefully constructed, went down in flames. Needless to say, we can still enjoy the good ones, as we can still enjoy G. K. Chesterton's *The Flying Inn* and *The Napoleon of Notting Hill*, which are laid in future periods that are now behind us and never came to pass as the author imagined. However, we can no longer pretend that the old hard science fiction yarns depict something that might actually be.

Indeed, the assumption that what we know today, or think we know, is all that will ever concern us, even within the confines of a single story, is perhaps more unrealistic than the wildest flight of fancy. I love hard science fiction but it does, by

definition, omit the crown of science—discovery of what is fundamentally new to us.

Besides, where do you draw the line between hewing to the facts and postulating additional facts which are not in today's scientific canon? Clement himself often allows faster-than-light travel, mainly because he needs it to get his characters to his alien worlds in reasonable time but partly, he has admitted, because of a feeling that it may be possible in spite of what most physicists say. Of late, work on the frontiers of relativity theory itself gives reason to suppose this could be the case (no proof . . . as yet).

Arthur Clarke's *Imperial Earth* is a splendid piece of hard science fiction, with all the technical details hanging together and ringing true. Just the same, he chose to power a spacecraft with a small black hole. Such may or may not exist; so far, we don't know. They ought to *if* conditions during the first few minutes of the universe's outward expansion were right. Cosmologists are still trying to establish precisely what went on then.

A few years ago I was asked to write a piece on "The Science" in science fiction for an anthology.* Seeking to clarify the subject, I set up four classes of story which look reasonable to me, though like all such they are very approximate and correspond to no sharp distinctions in reality.

The first class contains "hard science," as we have been considering at length. In the manner that I've attempted to show, it blends gradually into the next class, which employs "imaginary science."

**Nebula Award Stories Seven*, Lloyd Biggle, Jr., ed. (Harper & Row; 1973)

We can now go a little further into that.

I avoided the word "pseudoscience" because it has bad connotations that are frequently undeserved. Norman Spinrad coined the phrase "Rubber Sciences" in an essay on this literary device,** but I'll stick to my own, if only to avoid plagiarism.

The most obvious imaginary science involves standard concepts such as faster-than-light travel, time travel, and parallel universes. They can be used routinely, loosely, or brilliantly. This has nothing to do with literary quality. Let's make time travel our exemplar.

Routine use takes the concept for granted in order to get on with the story. L. Sprague de Camp cast the hero of *Lest Darkness Fall* back into Ostrogothic Italy by a lightning bolt, the same as I threw a modern American soldier back into tenth-century Iceland in "The Man Who Came Early." In either case, as in many others, the tale was really about matters like intercultural conflict. Perhaps the most famous, because beautiful and haunting, is Robert Nathan's *Portrait of Jennie*, which brings in time travel by sheer fiat. Such handling of imaginary science is as legitimate as the witches in *Macbeth*. Shakespeare probably didn't believe in witches himself and certainly didn't stop to develop the logical implications of their existence. He just needed them to start the story and keep it going.

"Loose" employment of a concept means "some treatment of it for its own sake, but no rigor." Too often, it is sloppy. The author goofs. As a case in

**In *The Craft of Science Fiction*, Reginald Bretnor, ed. (Harper & Row, 1976)

point, we have the ancient plot of the time traveler who becomes his own father or her own mother by the parent of opposite sex. No way could this happen, unless we rewrite the entire well-founded science of genetics. Ancestry would have to be rather more distant than that.

Sometimes, though, honorable fudging occurs. It may be for laughs, as in Fredric Brown's hilarious "Paradox Lost," wherein all time travelers are lunatics because only a lunatic can comprehend the theory of it, and have exterminated the dinosaurs by hunting them with slingshots. For the big dinosaurs, they used bigger slingshots.

William Tenn was equally funny in his "Brooklyn Project." There scientists worry that sending an object into the past might change the present; at the end, the world is totally altered, but of course nobody knows that and everybody takes for granted that no harm was done. Without the humor, I used the same general notion in *Guardians of Time*. If chronokinesis ever does come to be, I supposed that people would institute a patrol to regulate the traffic, and went into detail about its operations. The incentive to regulate was especially strong because history could in fact be diverted by someone who went back and affected a key point.

The looseness here consists not in violating such principles as causality—we can do that and still call ourselves honest craftsmen, if we know what we are about—but in omitting any real study of the consequences. Suppose you head off World War Two by visiting the year 1889 and strangling Hitler in his cradle. (Personally, if that was my aim, I'd try to keep Woodrow Wilson from getting elected Pres-

ident, but never mind.) Do you thereby create a whole new universe? If so, how, and what does this imply? (A. E. van Vogt asked that question in "Recruiting Station," and got a typically mind-boggling answer.) If you only create a new Earth—maybe, at first, only a new household in Braunau-am-Inn—how does this affect the rest of the cosmos? It doesn't take much thought to show how many more things need to be considered, and how many stories that consideration might bring forth.

My situation was that none of them was the story I wanted to tell. So I went ahead regardless, and seem to have been forgiven. The same is true of numerous colleagues, perhaps most notably Fritz Leiber, whose "Change War" series is rightly called classic.

Brilliant use is exemplified by Mark Twain's *Connecticut Yankee*, which first pointed out that intercultural conflicts would arise; H. G. Wells' *The Time Machine*, which first proposed that, if time travel is possible, people should be able to do it deliberately; and two novelettes by Robert Heinlein, "By his Bootstraps" and "All You Zombies." The first of these put time travel into a completely deterministic universe and showed, with merciless and hilarious precision, how cause and effect could get mixed up. The second went it one better, and even made it reasonable that a time traveler might be his/her own parent!

In short, "routine," "loose," and "brilliant" are neither swear words nor accolades; they merely refer to how the author treats his imaginary science for his particular narrative purposes. Already, then, we touch on what I have labeled "quasiscience," but let's not get into that for a while.

Imaginary sciences, fully developed, have provided the skeletons of many strong stories. Van Vogt and Charles L. Harness come immediately to mind as masters of the form, as Raymond F. Jones was earlier. In general, much of a tale like this consists of the characters' piece-by-piece discovery of a strange set of phenomena. (Occasionally the characters know all about it from the start, and it is the reader who gets the gradual revelation.) This does not mean that there can't be human beings involved. Consider Isaac Asimov's *The End of Eternity*, A. J. Budrys' *Rogue Moon*, or Samuel R. Delany's *The Einstein Intersection*, to name three works almost at random.

They are not quite at random, because, while their authors can write "hard" whenever they choose, they are perhaps best known for explorations of imaginary science as well as for literary qualities. For example, Asimov's robot stories may fall under this rubric. Though we don't know anything which would, in principle, forbid us designing such humanlike machines, we don't know for sure that it can be done, the way that we knew back in the 1930's that a spaceship able to land on the Moon could be built. Granted, this is a borderline case, which could arguably be put in the "hard science fiction" category. Asimov's psychohistory is more germane, but I'll come back to it later.

As Spinrad says in his essay, good "rubber science" requires that the author know real science and not violate it unless he is fully conscious of what he's doing and what it means. Thus, when Slipstick Libby in Heinlein's *Methuselah's Children* presented the spaceship he was on with a drive which, in effect, cancelled its inertia, his friend

Lazarus Long worried about what that did to the conservation of energy. Libby replied—in a few sentences which repay close study, because they summarize a great deal of the philosophy of science—that conservation of energy is a generalization from a finite number of observations, and that there is no logical reason why the function which describes it cannot have points of discontinuity. I am rephrasing his colloquial language on purpose, in order to emphasize that this is not mere gobbledygook like “Harold Hero switched on the dreelsprail fantangler, which hypewangled him and Sue Submissive into the seventy-eighth chorp dimension.” Heinlein makes a statement which, if true, would not deny what we know but would extend it. At the same time, he indicates what *is* true, that certain extensions of knowledge imply that we must revise our entire image of reality—the kind of revision which relativity and quantum mechanics forced upon the Newtonian and Maxwellian schemes.

Doubtless the most overworked and otherwise maltreated imaginary science has been that group of notions lumped together as “psionics.” Readers who came to science fiction much later than me have missed the excitement when some stunning new concepts or treatments first appeared; but they have also been spared some dismal periods. One of these occurred in the late 1950’s and early 1960’s, when it seemed that every second item in the magazines was a piece of hackwork about a telepath or a telekineticist who went to Las Vegas and won a fortune, or about a dogmatic Establishment scientist who denied that dowsing worked but was refuted . . . etc., etc., etc. We are as well rid

of these things as we are well rid of the spate of stories which, slightly before, dealt with computers that suddenly acquired consciousness.

Nevertheless, at least one moving, memorable tale came out of the latter fashion, Oliver La Farge's "John the Revelator." As for psionics, the narrative possibilities have always been large, and have sometimes been realized. Several of Theodore Sturgeon's finest works, e.g., *More Than Human* dealt with what it could mean to people to know each other so directly. This is only to mention one writer out of a number.

The imaginary science itself was explored in various interesting directions. Clement's "Impediment" suggested that it might do a telepathic alien little good to learn how to read the mind of a human being, because we are not a telepathic species and therefore each of us develops a unique interior language. Heinlein, with his usual convincing touches, showed telepaths being used in military communications (*If This Goes On*, also known as *Revolt in 2100 A.D.*) and elsewhere made a broader spectrum of psionic powers the entry to examining a Bishop Berkeley kind of universe (*Waldo*). Alfred Bester's detailed pictures of telepathy in *The Demolished Man* and teleportation in *The Stars My Destination* are science fiction landmarks, brilliant both in employment of the ideas and in style.

Let me omit further distinguished examples and mention two small things of my own, because they are my own and hence I know what went into them. In "Journeys End," I supposed that telepathy might occur as a great rarity—which in itself was nothing new—but, given our kind of society, the

telepaths might find they had to shun each other because mind-reading was too deep a violation of privacy. (The story must have touched a nerve, because it's frequently been reprinted, though editors *will* put an apostrophe in the title. Anthony Boucher, who first published it, told me that he had to fight to keep that apostrophe out.) In "The Martyr" I developed the concept of psionic ability as something that evolves in a species and leads at last, in a rationalistic fashion, to survival of the personality after bodily death; but it turns out that we humans aren't that far-evolved. (I'd intended the story as a chiller, but one young lady wrote to tell me that it was so beautiful that she spent the evening in tears. This writing game is full of surprises.)

In short, psionics is perfectly proper imaginary science. It simply got misused for a while in fiction, and the time may now be ripe for new insights about it. Frank Herbert's *Dune* trilogy and Gordon R. Dickson's "Childe" cycle certainly give us powerful modern cases.

Furthermore, just as real science can no longer quite scoff at faster-than-light travel, time travel, or parallel universes, so can it no longer quite scoff at psionics. While Martin Gardner, notably, has done a demolition job on the claims of people like J. B. Rhine, still, enough facts remain to show what ought to be obvious, that we don't know everything in this area either.

I am, myself, of skeptical temperament, and I cut my philosophical teeth on the most hard-boiled logical positivism. Nevertheless, I have witnessed water dowsing, in a limited way; it wasn't feasible to drill a well on the spot, but the rod twisted at the same place for about half the persons present,

none of whom were credophiles* and one of whom later admitted that he meant to clown it up and got quite shaken when the rod seemed to take on a will of its own. The same object was inert in my hands. However, afterward John Campbell persuaded me to try dowsing a buried conduit and it worked, as he said it works for fifty percent of the population. I have subsequently experimented elsewhere and, in a somewhat imprecise fashion, can still do the trick. To her disappointment, my wife can't.

In short, I have reason to think there is something real here. It need not be occult, and in fact I would fiercely deny that it is. Marginal sensitivities to change in quantities like terrestrial magnetism may well explain it. Indeed, years ago Y. Rocard, a French physicist, made out an excellent case for this being what goes on in water dowsing.** I would go so far as to call the scientific establishment remiss in not encouraging intensive study of phenomena of this kind, because of the light they may throw on the workings of the nervous system.

About telepathy, telekinesis, and the rest, I have no personal information, nor any second-hand accounts that satisfy. A few legitimate scientists are looking into them, and in any event, they remain suitable material for science fiction—if handled right.

Part of the appeal of psionics, like the appeal of biology and anthropology, no doubt lies in the fact that they feel closely human. Spinrad says that with

*Thank you L. Sprague de Camp, for that lovely word.

***Le Signal du Sourcier* (Dunod, 1964). Michael Gauquelin's *The Cosmic Clocks*; Henry Regnery, 1969; Avon paperback, 1969) makes out a rational case for studying possible planetary influences on humans.

the "rubber sciences" we are not off in a chilly Newtonian universe as we are in hard science fiction, but into individual people. I disagree with the literary theory implied by his remark. Was there ever a more relentlessly Newtonian story than Stephen Crane's "The Open Boat," and have there been many that were more human? The same could be said, within science fiction and perhaps to a lesser degree, of Tom Godwin's "The Cold Equations." Nevertheless, I can't deny that hard science and imaginary science which touch us right where we live have a special power. In fact, earlier in this series I suggested that biological speculation may tend to get underplayed as such precisely because it leads so easily to emotional themes.

Now several recognized sciences are directly concerned with our own species. Some of them, even the most intolerant positivist must admit, are reasonably hard. For examples, we have modern prehistory, with its careful excavations, its statistical analyses, and its use of physics, chemistry, and biology. We have modern historiography. (When word-frequency studies show that St. Paul cannot have written every one of the epistles traditionally attributed to him, that's getting pretty scientific!) Anthropology is less rigorous, because much of its material is necessarily anecdotal and no observations made on cultures can be exactly repeated, but still does have a scientific character. We can proceed to more controversial areas such as economics and psychology. Whatever one's opinions about these, the fact is undeniable that a few schemes in economics do have some predictive value, and various results in experimental psychology do make statistical sense—not to mention re-

search now going on into things like brain chemistry.

All disciplines of this kind are vital nourishment for science fiction. Its writers need to know a fair amount of history, anthropology, economics, and the like. Jerry Pournelle has gone into this at length in his essay "The Construction of Believable Societies,"* and has applied the principles himself in many excellent stories.

For present purposes, though, I just want to point out that, because they are less quantitative than physics, these human sciences blend still more readily into the imaginary. Everybody agrees that we are far indeed from full comprehension of how our own affairs, public and private, work. Some thinkers hold that eventually we can come to a better, more exact understanding. Whether this be true or not, which only time will show, it is a potent theme for science fiction.

Asimov's *Foundation* series is surely the most famous case. There he assumed, for narrative purposes, that the kind of historial pattern described by Spengler, Toynbee, and other scholars is real, not merely something they read into the facts. He also assumed that the analysis can be carried much further than it has yet been, can be made mathematical—given large enough populations, as thermodynamics requires large enough numbers of molecules. Then it might become possible to set up initial conditions such that society *must* move in foreseeable directions . . . unless a freak like the Mule appears.

*In *The Craft of Science Fiction*.

The stories are a landmark like Bester's, though, oddly, they too have not been quite what you would call seminal. That is, they haven't inspired many successor tales, exploring different aspects of the basic concept, in the way that *Frankenstein* and *R. U. R.* did. I don't know why. Certainly the psychohistoric motif seems a rich one.

I've had a go or two at it myself. In *Question and Answer* and related yarns, I suggested that the prospect of a science like this might generate a fatal *hubris*. In the "future history" which includes Nicholas van Rijn and Dominic Flandry I've employed a chronological scheme, with rationales, of rise-breakdown-decline-fall which draws on several researchers into the subject. Others have done similarly, of course, not usually assuming historical cycles, but taking historiography, economics, and the rest of the human sciences as source material. Mack Reynolds probably has the primary reputation for doing this, but I'd say that Dickson, Herbert, Pournelle, and Jack Vance are equally capable, in their different manners (a non-exhaustive list).

Thus we find that science fiction, with its elements of pure imagination, is—on one side of the family, at least—a child of science, which itself has elements of the same pure imagination. Since the last part of that sentence may look outrageous to some readers, and may on the other hand encourage some readers of a different turn of mind to believe that anything goes, it requires explanation. I think we've reached the time for a closer look at real science, not so much the current findings as the underlying philosophy, and will attempt that in the next part of this series. ●

